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On the Planning of Certain Government Hospitals

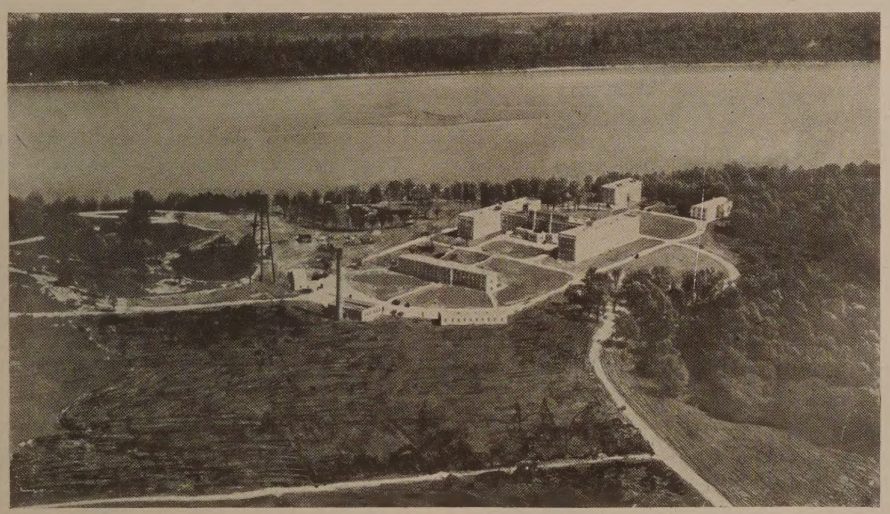
Recently Constructed by the United States Treasury Department

By Louis A. Simon

Washington

WHEN the existence of a great emergency leads the Congress of these United States to authorize an extensive programme for the hospitalization of ex-service beneficiaries, and when that programme is supported by the appropriation of millions of dollars for construction work, there are immediately released flashes of interest that spread out in many directions and register in a variety of ways.

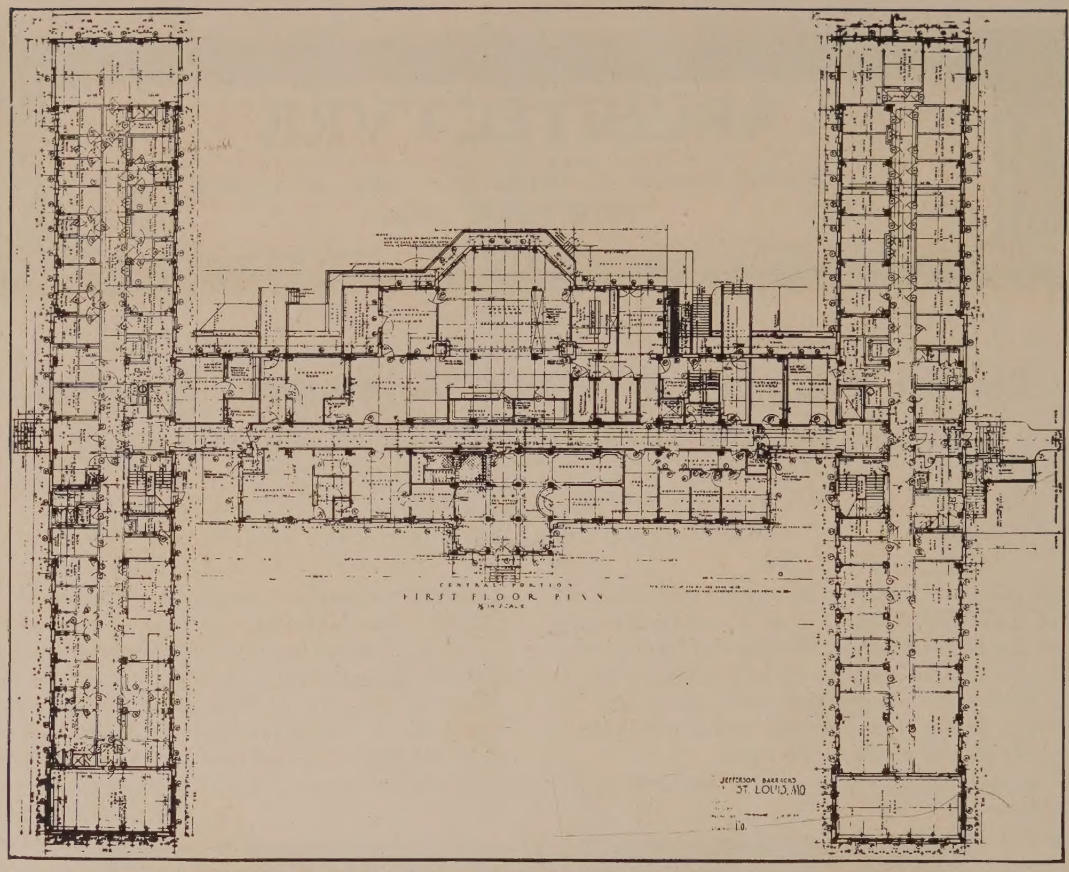
There is the registration on the mind of the enthusiastic admirer of the ex-service men and women who answered the call of their country; there is the effect on the ex-service man himself, expressed for the most part through the Veterans' Legion, of which he is a part, and there is the effect on the mind of the medical man who sees the possibility of having his dreams of an ideal hospital brought to reality and fathered by an all-powerful government; and then there is the architect; he also has his dreams—perhaps he of all men—and the contractor, the material man, the realtor, and the politician; each receives the flash in his own way and as bearing on interests more or less personal to his own world.



Aeroplane view, hospital group, Jefferson Barracks, St. Louis, Mo.

In the Hospital Act of 1921, appropriating $18,600,000, Congress took one of its earlier steps in the direction of general hospitalization for the beneficiaries of the government, and placed in the hands of the Secretary of the Treasury the responsibility of carrying out its objects. That legislation led this country into fields of endeavor which it had not previously encountered in just the same way or to the same extent. It was prompted by a great altruistic purpose, nor was altruism found wanting in those who were most concerned in carrying out the intent of the law, despite the fact that the side swirls and backwaters of many contributing streams of influence threatened to be drawn into the main current. For the most part these were abortive so far as concerned any serious effect on the main objective, and it remained for the government to evaluate the various elements of its programme and by an elective process to steer its course sanely and safely toward the consummation of a reasonable result in the shaping of its final policies.

At the heart of the matter stood the ex-service men and women who offered their all for a great ideal. The problem begins there and it ends there. Primarily it was the medical man's problem, and through the board of consultants on hospitalization, appointed by the Secretary of the Treasury to formulate the programme and follow up the execution of the Act of 1921, the task was attacked with a degree of initiative and force that promised, and realized, a successful outcome. The questions involved at the outset were many: "Where should the centres of hospitalization be placed in a great country comprising an area of over three million square miles?" "Where was the relative density of population which would contribute the patients who would use the hospitals?" "What general classes of patients were to be treated, and how many of each?" "What number of patients was to be taken as the peak load, and when might that peak be expected to arrive?" "What standards of treatment were to be aimed at, and what arrangement of plan and grouping of building units would best further the standards



Plan, main building, Jefferson Barracks, St. Louis, Mo.

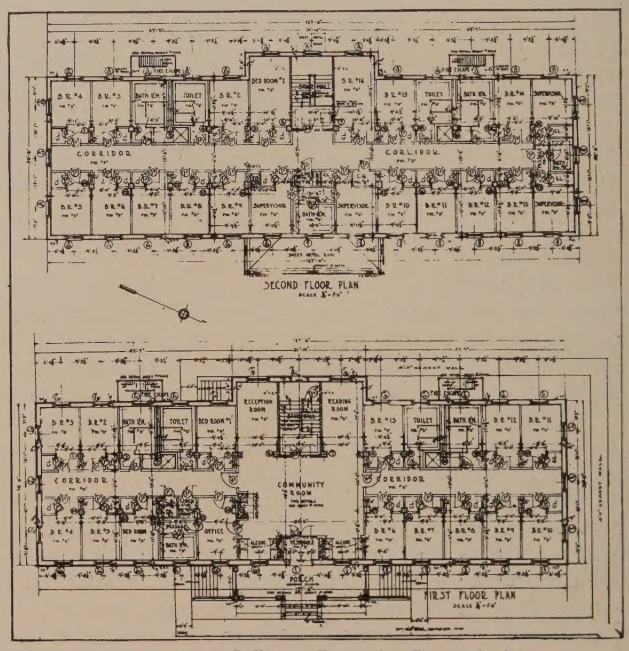
adopted?" "What ratio of personnel to patients should be laid down for the operation of the hospitals?" These and many other items contained within each of such questions were the outstanding factors calling for first attention, and the

Nurses' quarters, Jefferson Barracks, St. Louis, Mo.

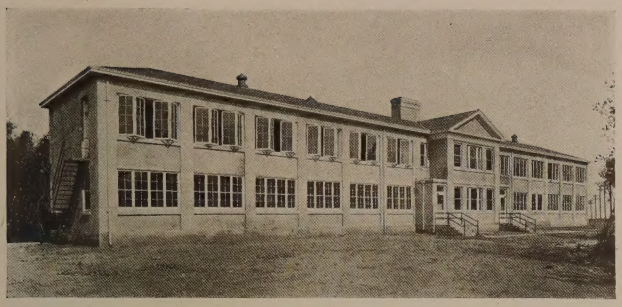
Treasury Department, through the secretary and assistant secretary, the board of consultants, the office of the Supervising Architect, the public health bureau, and other government officials shouldered its way out in establishing the policies to be followed.

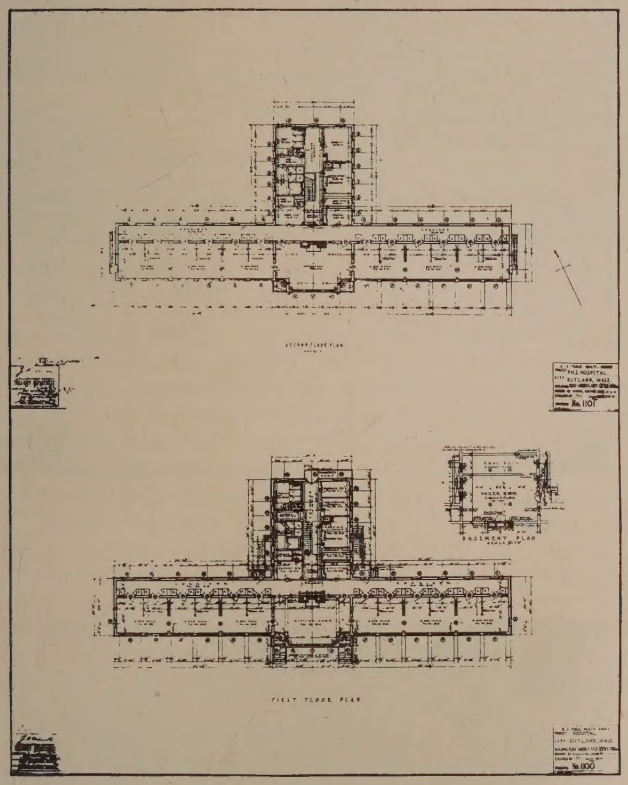
At the beginning the hospitals to be constructed were brought down to three principal classes: general hospitals, tuberculosis sanatoriums, and neuropsychiatric hospitals. Through the advisory board, called in by the consultants on hospitalization, there was brought to bear on these problems the experience of the National Association for the Prevention of Tuberculosis and the National Committee for Mental Hygiene. Under authorization of the Hospital Act of 1921, nineteen hospital stations were constructed, extended, or remodelled. These were placed at the following points:

Lake City, Fla.	Dayton, Ohio.
Whipple Barracks, Prescott, Ariz.	Marion, Ind.
	Milwaukee, Wis.

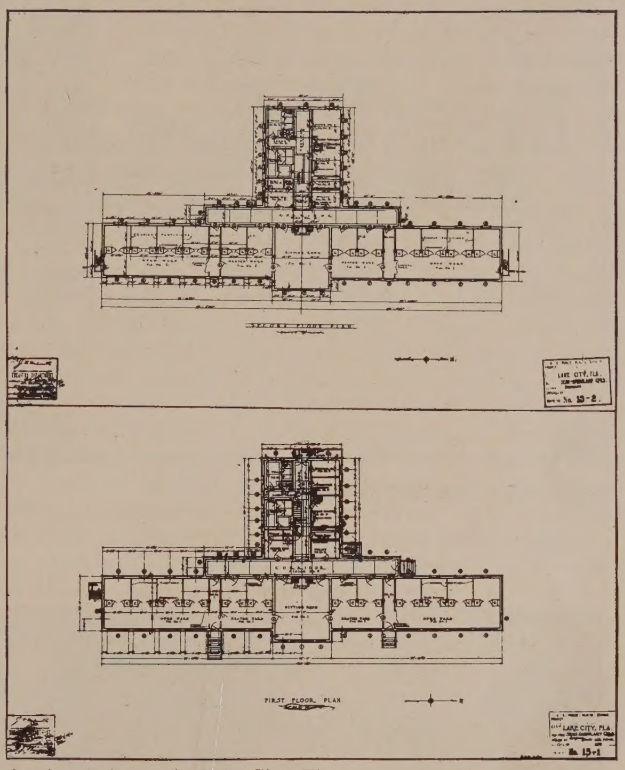


Plans, nurses' quarters, Jefferson Barracks, St. Louis, Mo.





Semi-ambulant unit, Rutland, Mass.



Semi-ambulant unit, Lake City, Fla.

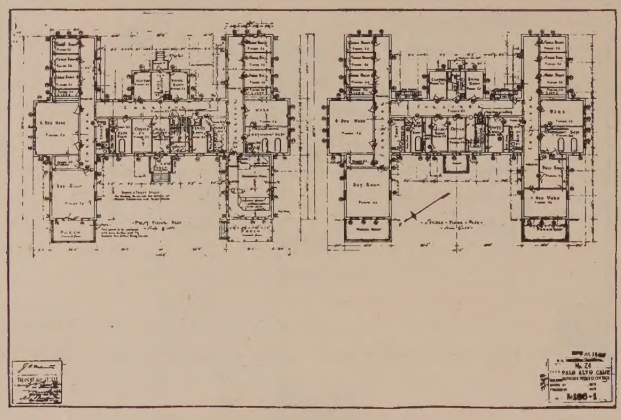
Fort Logan H. Roots, Little Rock, Ark.
Fort Bayard, N. Mex.
Perryville, Md.
Fort Walla Walla, Wash.
Rutland, Mass.
Augusta, Ga.
Castle Point, N. Y.
Oteen, N. C.
Fort McKenzie, Wyo.
Bronx, New York City.
Tuskegee, Ala.
Palo Alto, Calif.
Jefferson Barracks, St. Louis, Mo.
Alexandria, La. (rehabilitated only).

The bed capacity provided at the individual stations varied from 200 to 1,100; the total being 6,258.

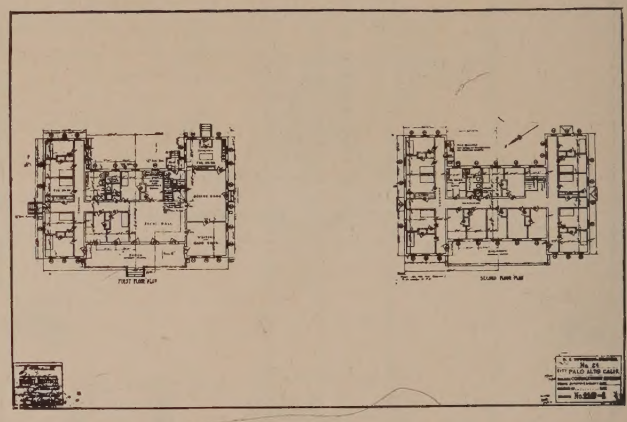
In the hospitalization of its veterans, the government was confronted with an emergency condition in which the construction of government-owned buildings in the shortest possible time was of paramount importance. Nevertheless, keeping in mind the niceties of relationship to be maintained between the first cost of construction as affected by selection of types of construction and kinds of materials, as against cost of upkeep as determined by that selection; the cost of operating the various stations as affected by the interior arrangement of the individual buildings and by the disposition of the buildings themselves in the hospital group, it was soon determined that the time spent in designing standard types for each class of hospital, while possibly delaying the beginning of actual construction on new stations, would result in a material saving in time in the completion of the hospital programme as a whole. The soundness of this position was further indicated by the fact that there were four or five projects consisting of enlargements of existing government-owned stations formerly used for army posts or hospitals, drawings for which could be taken up while the standardized plans for new construction were being evolved.

Much has been said about the dangers of plan standardization, and yet within the bounds of certain fundamentals, and giving due weight to the necessary variants to meet conditions of climate, topography, and other regional differences, plan standardization in its application to a large programme lends itself to a more thorough study of the basic facts within a limited time.

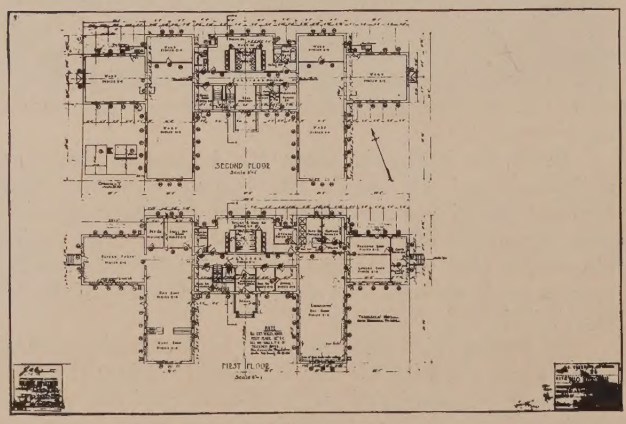
In dealing with such questions as the maximum advisable patient capacity for any individual station; the degree of patient concentration acceptable in any one unit; the maximum capacity for large wards and the proportion of these to small wards and to single rooms; centralized feed-



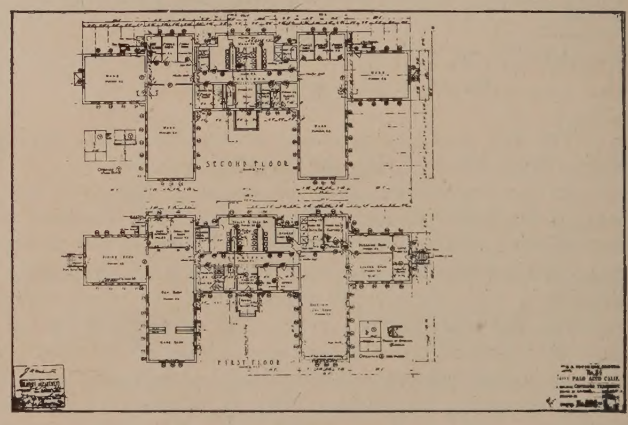
Disturbed patients' unit, Palo Alto, Calif.



Convalescent unit, Palo Alto, Calif.



Re-educational unit, Palo Alto, Calif.



Continued-treatment unit, Palo Alto, Calif.

Standard hospital chapel.

ing systems as against systems of separate kitchens to serve smaller groups, the architect finds in the study directed toward plan standardization the readiest means for reaching the larger conclusions in their proper order and for diverting the medical mind from lengthy discussions on details of arrangement that cannot be decided until after the larger issues have been determined.

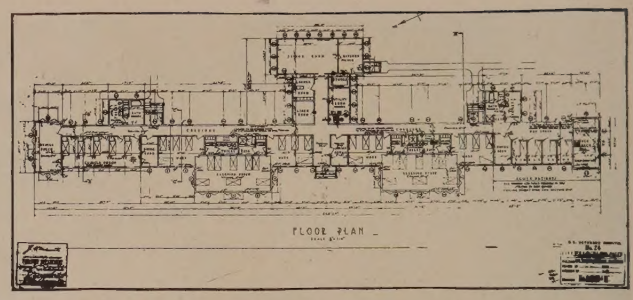
Concerning the admissible degree of concentration, the results of numberless studies led finally to the adoption of a middle course which gave a reasonably concentrated plan for the main building of each group; that is, the infirmary of the tuberculosis sanatorium and the diagnostic building of the neuro-psychiatric station, while a more or less extended grouping was adopted in the disposition of the smaller units for ambulant and semi-ambulant patients of the former class of hospital, and for the disturbed, continued, treatment, re-educational, and convalescent patients of the latter class of station. The patient capacity of the standard tuberculosis infirmary ranges from 200 to 500 in accordance with the variation in number of wings and stories; while the diagnostic building has accommodations for 138 as suitable for stations up to a total patient capacity of 500. The smaller units memtioned were arranged to accommodate from 48 to 60 patients each.

Accepting as fact that short lines of circulation between closely related units and parts of units make for economy of operation; that centralized kitchens supplemented by congregate mess halls with cafeteria service have their value where the class of patients justifies such arrangements; that carefully studied planning for medical and general administration, unified or separate as the case may be, insures the possibility of easy operation of the station; granting all of this, it still remains a separate problem in itself to co-ordinate the divergent views of doctors, nurses, dietitians, and hospital managers, if anything like a standard plan is to be evolved. A very wide margin of differences must be brought to a compromise when it comes to deciding on the relationships that should be maintained in the disposition of the component elements of the plan. And, above all things, in the realm of food-distributing systems may lie the germ of the failure to agree on a hospital plan that would otherwise be accepted as a success.

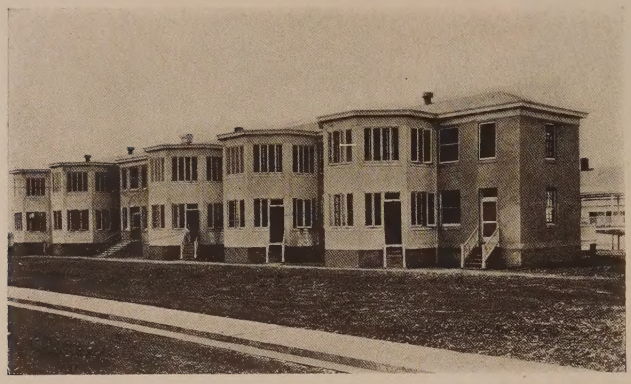
Happily, the need for veterans' hospitals came at a time when the larger view of the place which the hospital occupies in the social fabric was well understood. Obviously, the influence of environment on the mental state of the patients and of the staff bulks large in any hospital planning, but especially is this the case in the hospitals for government patients, in that the service of the government to its beneficiaries is not confined to the treatment of the physical disability which brought them to the hospitals. Beyond the occupations arranged as a part of the indicated medical and surgical technic, there is a further aim in the establishment of the patient's economic well-being and its continuance after his discharge—social service in measures broad enough to establish the man and his family in normal relationship to the life of the community in which they are to make their home. The aim is to create in the hospital, so far as may be, the atmosphere of normal living and to keep the pulse of the institution in time with the throbs of every-day life; through directed recreation and daily occupations to lead into the hospital the best outside influences as physical and mental therapeutic agencies. To further this object there is much that can be accomplished in the planning of the buildings and of the grounds surrounding them. For one class of patients there will be the need for the stimulation which association with others can give, and for this purpose congregating rooms, day-rooms, and recreation spaces are furnished. For those whose needs are the reverse, reading-rooms, single bedrooms for quiet, or even for isolation, must be furnished. While for those whose greatest need is for some form of self-expression, space for vocational work is provided, where training in academic, mechanical, and agricultural pursuits is given.

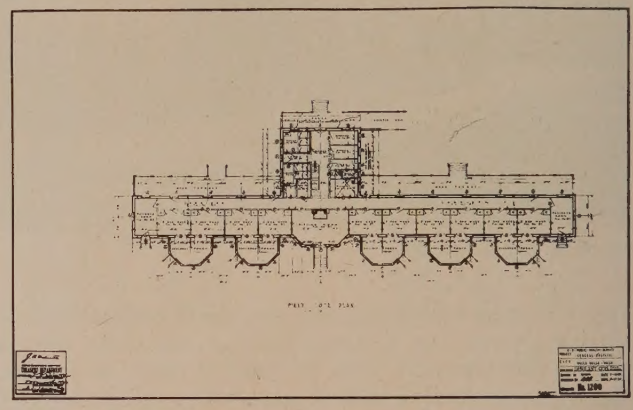
For the main building of the general hospital, the "H"-type plan, used by the Treasury Department several years before the general programme of hospitalization came into being, was found to lend itself to development as a standardized type of general hospital. Reference to the accompanying plan of the main building at Jefferson Barracks, St. Louis, Mo., shows the two end wings arranged as patients' units, connected by the centre wing in which are placed the admitting department, administrative offices, the general kitchen and congregate dining-rooms, and the professional

Mess hall and kitchen, Augusta, Ga.

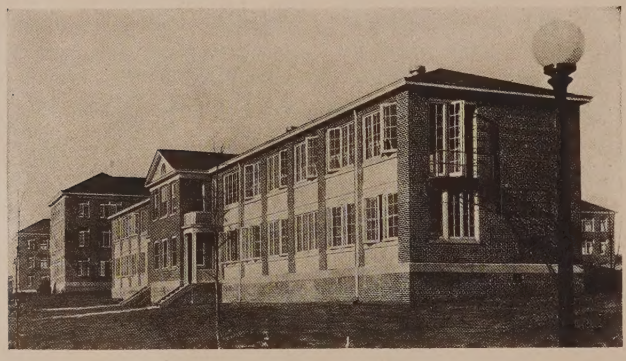


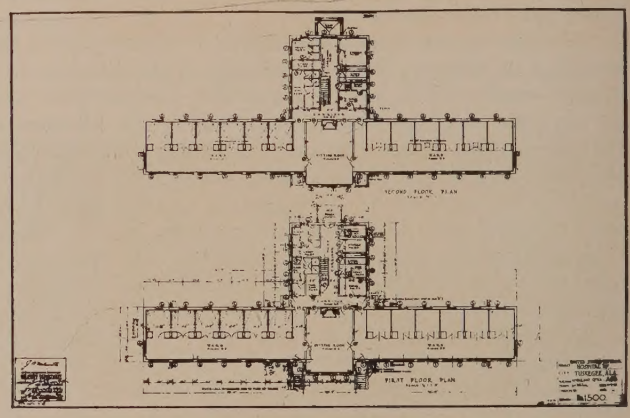
N. P. tubercular unit, Palo Alto, Calif.





Cold climate ambulant unit, Walla Walla, Wash.

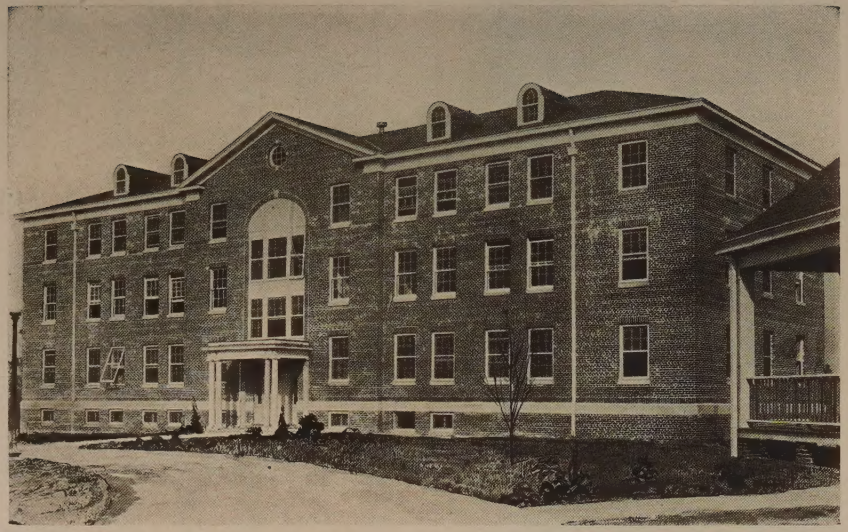


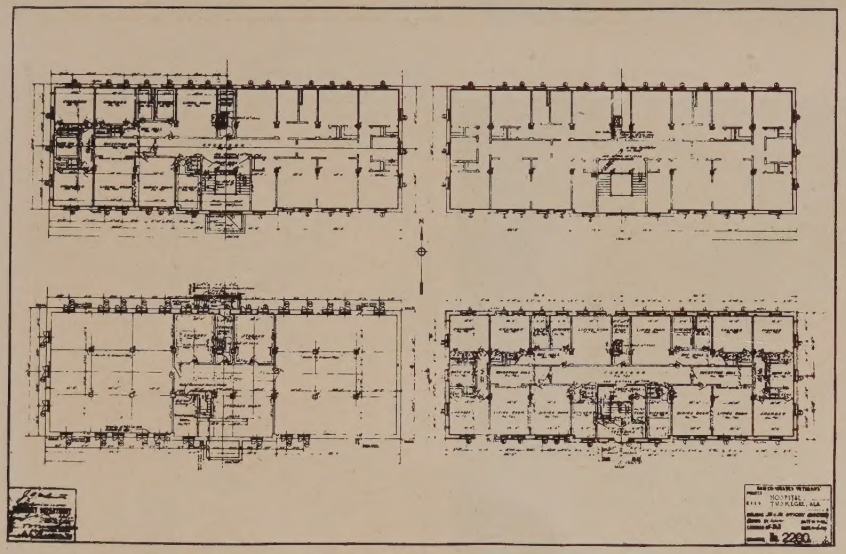


Ambulant quarters, Tuskegee, Ala.

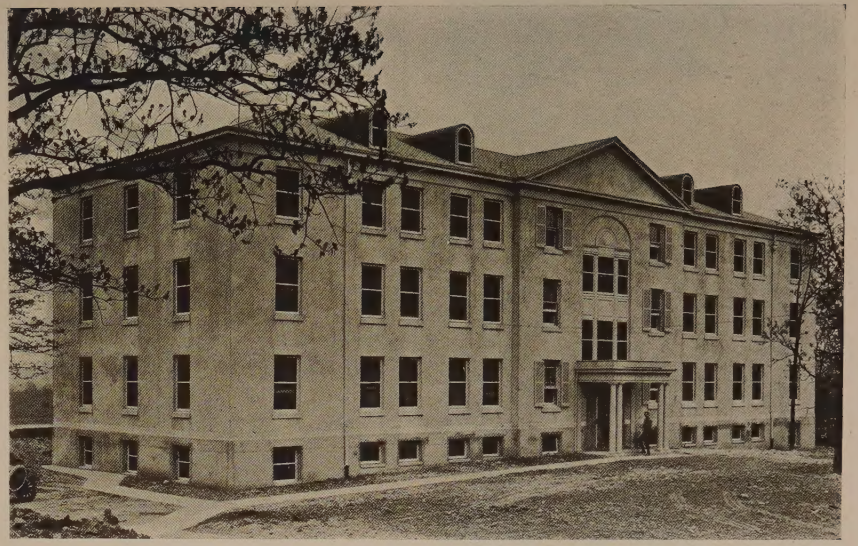
Cubicle ward (open), Oteen, N. C.

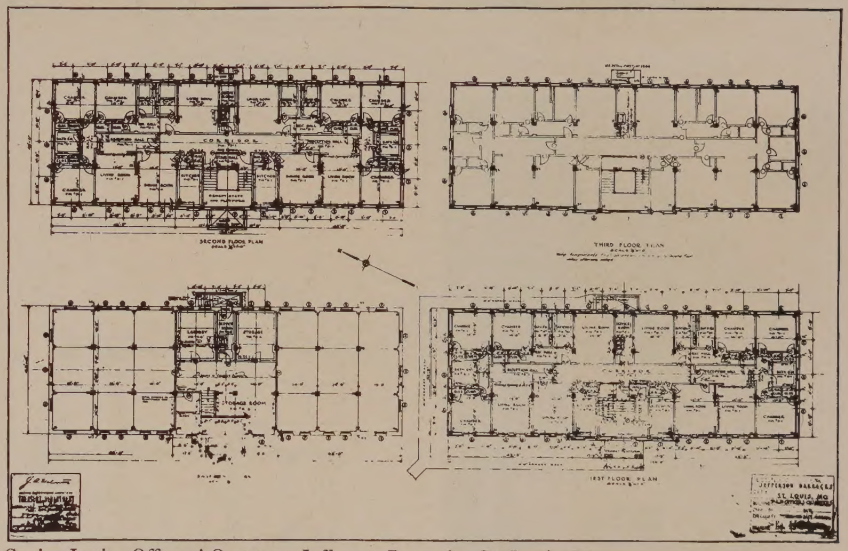
Cubicle ward (closed), Oteen, N. C.





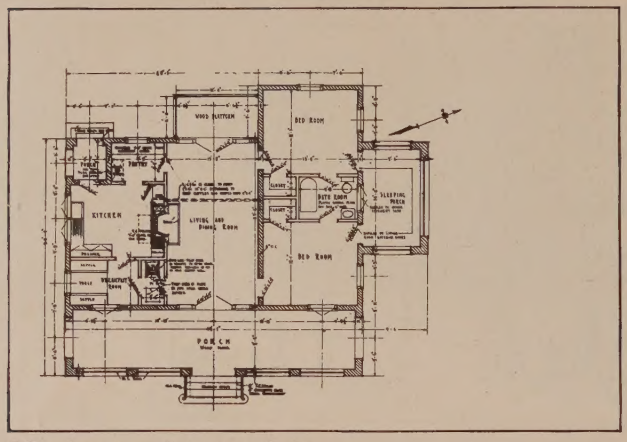
Senior Junior Officers' Quarters, Tuskegee, Ala.



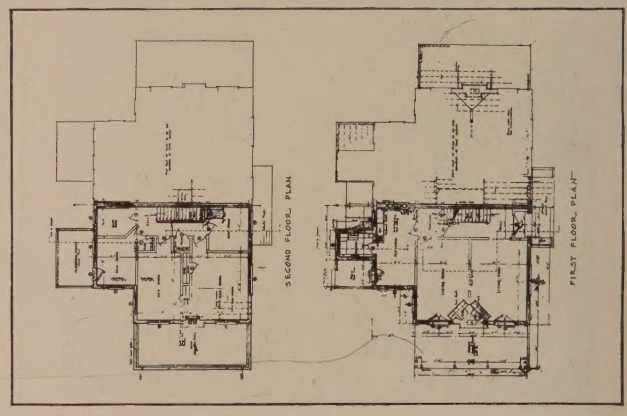


Senior Junior Officers' Quarters, Jefferson Barracks, St. Louis, Mo.

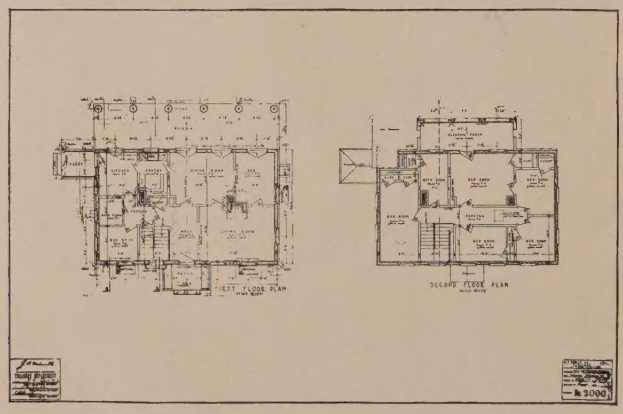
Hospital planning, when divested of its attendant complications and freed from the mysteries with which hospital specialists are prone to surround it, resolves itself into the process of focussing the attention on the patient, and so arranging the plan that the patient may readily be brought to certain places and that certain things and services may readily be brought to him, and, withal, creating for him such an environment as will best meet his mental as well as his physical needs. And as a close second to the primary consideration of the comfort, convenience, and treatment of patients there arises the importance of so arranging the plan that a medical and nursing staff of reasonable numbers may do their work without loss of time and with a minimum of expenditure of that motive power of the whole plant which may perhaps best be described as staff energy.



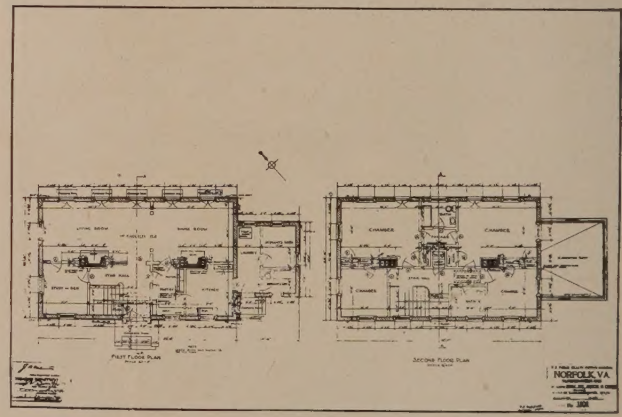
Officer's cottage, Palo Alto, Calif.



Standard type, officer's cottage, double house.

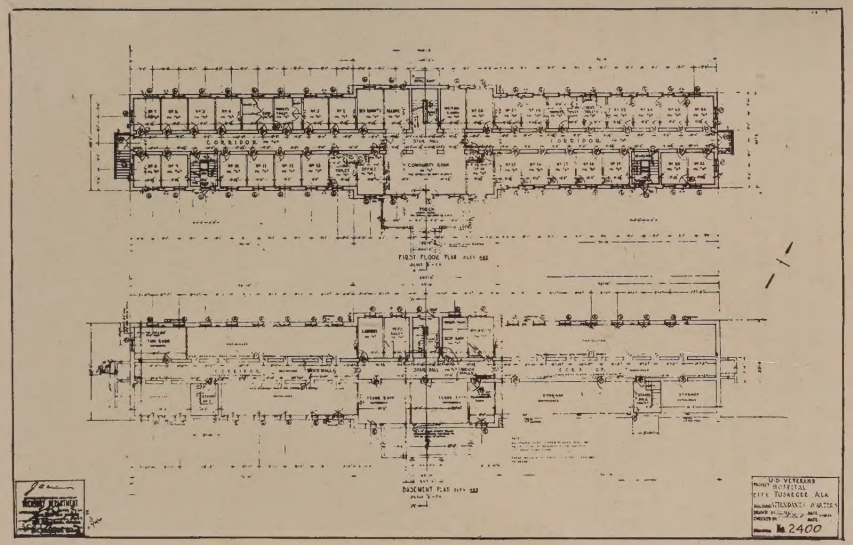


Standard type, officer's residence.

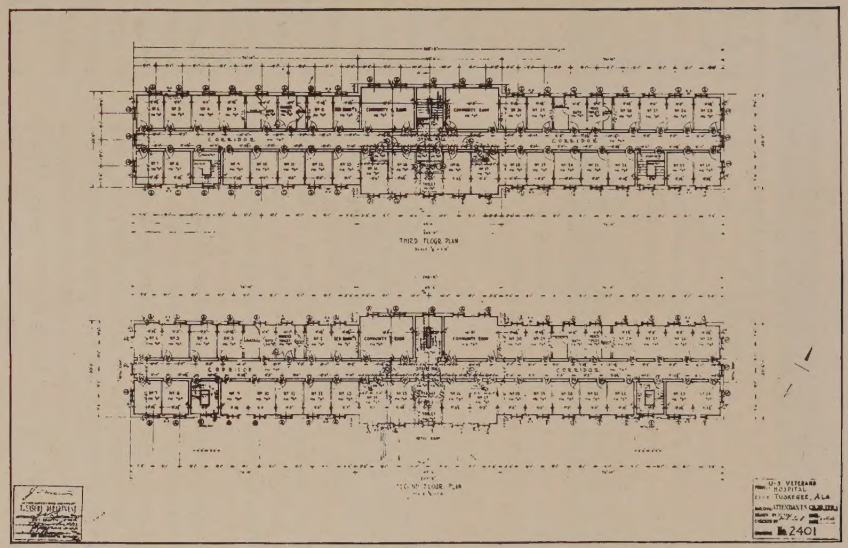


Standard type residence, officer in charge.

Attendants' Quarters, Rutland, Mass.



Attendants' quarters, Tuskegee, Ala.



Plans, Attendants' Quarters, Tuskegee, Ala.

In the housing of the resident medical and nursing staff, any grouping which fails to recognize the necessity for some degree of home life for doctors and nurses, separating their off-duty time definitely and distinctly from hours of duty, fails by just that much to provide an important element in the successful hospital. The detached and semidetached houses for doctors, and the apartment-house quarters when circumstances made these necessary, aim to give the medical staff the same opportunities for family life as would be obtainable outside of a government reservation. For the corps of nurses, living quarters with the refinements of a home—a separate mess, reading, and study rooms, and recreation space, where nurses may express something of their own individuality and escape the crushing effect of the otherwise uninterrupted régime of a large hospital, are considerations of an importance that it would be hard to overestimate.

utilities; *i. e.*, operating and X-ray suites, laboratories, space for dental and for eye, ear, nose, and throat work, and including also an extensive physiotherapy department. This plan well illustrates the principle of circulation shortened so far as the object in view will permit.

For the infirmary of the tuberculosis sanatorium as shown by the plan for Castle Point, N. Y., the adaptation of the "H"-type plan gives a somewhat different treatment of the centre wing, with a separation of the administration unit in front and with such differences in arrangement of the end wings as is required for tuberculosis patients. This standard infirmary plan is based on that designed for the infirmary buildings at the homes for disabled volunteer soldiers.*

The plan for the diagnostic building as shown in the illustrations of the neuropsychiatric hospital, at Palo Alto, Calif., indicates the possibilities of the "H" plan when adapted for a class of patients requiring greater segregation than is the case with those occupying a general hospital or a tuberculosis infirmary. The introduction of secondary entrances, separate dining-rooms in each of the end wings, and the variation in the subdivisions of space therein, provide for the radically different kind of treatment necessary for mental cases.

The planning of the smaller units followed the generally accepted idea of having smaller groups of patients living together as tending toward a less institutionalized mode of life. For stations in moderate and warm climates the plan of the ambulant unit at Tuskegee, Ala., is typical, with the sleeping wings on each side of the day-room, and the utilities concentrated in the centrally placed wing in the rear. While for use in a cold climate there is introduced the rear corridor and the projecting bays to catch an added amount of sunlight, as shown for the station at Rutland, Mass.

The semi-ambulant units for the Castle Point, N. Y., station show a variation from the general type, in the provisions made for two day-rooms placed to overlook an extended view obtainable at that particular place, and also show the protected dressing corridor separated from the sleeping cubicles. The smaller units for the neuropsychiatric station at Palo Alto, Calif., carry out on a smaller scale the principle of segregation indicated in the large diagnostic building of this class of hospital.

While it is not within the purpose of this article to go into the detailed question of costs, it is of interest to touch on the fact that before a comparative cost curve for hospital construction can be plotted a very definitely arranged series of conditions must be set down on the base-lines of the chart. The phrase "cost of a hospital" is so loosely applied that it means next to nothing without the knowledge of the chart's limiting base-line. Character of site and its location in relation to transporation facilities and mechanical utilities; the kind of buildings and the number of stories for a given cube volume, cubage allowed per patient, gross and net; the degree of refinement aimed at in the medical and surgical technic; the amount of general equipment and the amount of fixed and portable special equipment included; these are only a few of the cost variables which, added to regional differences attending comparison of any construction costs, emphasize the caution necessary in using hospital-cost figures.

Suffice to say that for the nineteen projects included in Hospital Act 384, of the year 1921, the average cost closely approximated $2,936 per bed. The cost per bed of the different stations ranged from about $725 for a rehabilitated government station to $4,342 per bed at a new station constructed on an unimproved site. In one case of this class, the price per bed reached $5,300 on account of the presence of special expenses involved in mechanical utilities and because the station is within the area of specially high labor costs.

To look back over the course of hospital planning of the last two or three decades is to find that the successive and radical changes in the ideas about hospitals had as their directing influence the advancing theories of technic in the treatment of disease and in surgery, and the temptation to provide in a plan all the refinements which the extremes of this varying technic might at any particular time suggest, is felt in direct proportion to the amount of money which the architect has at his disposal. But he must inevitably come to the realization that hospital planning, like life itself, is not a static but a flowing process, an operation of constantly changing conditions. The best the architect can hope for is to absorb the sense of direction in which the best thought of the time is moving and to plan his buildings as a stepping-stone toward the ideal hospital of the future.

* The architectural, engineering, and field work for sixteen of the nineteen projects of the 1921 Act were in charge of the Supervising Architect's Office, Treasury Department. The architects for the hospitals at three soldiers homes were Messrs. Schenck & Williams, Dayton, Ohio.

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Editorial and Other Comment

Building Homes

THAT there is a surprising amount of residential building going on needs but a casual glance from the car-window of any train going out of our cities. Thousands of homes have been built during the past year and thousands more are going up as fast as they can be put together. About New York, especially on Long Island and in Westchester, the sound of the hammer is continuous and the frames of houses of all kinds may be seen in various stages of completion.

The same condition prevails when you cross the line into Connecticut, and it will be only a year or so when the available land along the New Haven road will be fully occupied. The cities and towns that have stood as separate entities promise to be joined together in one unbroken and indefinable assemblage of homes for the people—people of moderate means, as a rule, thousands who have been compelled to leave the crowded city and the constantly increasing city rents.

For thousands there is no alternative, and as long as present wage scales are maintained, there can be no possibility of rentals coming down to pre-war figures. The suburbanite has been multiplied by thousands, and the numbers going to the smaller places mean that in the future even the out-of-towners will have to pay a much larger tax rate and that families with children will be met with mounting costs of living even in the country. The more homes, the more children; and as a corollary the more schools and need for town improvements, all of which calls for greater outlay on the part of the taxpayers.

Over in New Jersey the land is being taken up in like manner, and populations are increasing by leaps and bounds. It all means a certain amount of prosperity for some, but the madding crowd is ever pursuing and land is increasing so in value as to make it no longer possible for the suburban dweller to have more than the ordinary restricted narrow town lot. This makes for congestion in small places, and the old dream of country privacy will soon be indeed only a dream.

This is the condition in the East, and the same conditions are rapidly developing all over the country.

The housing problem in the great centres of industry and in the cities has passed the state when any prediction of a satisfactory solution can be made. The future is something that not even the most sanguine of believers in the capacity of our big country to absorb the universe can think of without pause for very serious thought.

Unless we are to be blessed with an immigration policy that fully realizes the imperative need of more time to assimilate our present overplus of aliens, we are inclined to look with grave forebodings upon what the next few years may mean. In our industrial greed and belief in the mighty shibboleth of America, the land of the free, in the belief that we can harvest a crop of succulent fruits from a garden of weeds, we have been planting the latter until the land of our fathers has become the land of all the races of the world but those who speak our language and think in terms of the founders of our country. The melting-pot is seething with an unsavory stew, obvious at last to the awakened Americans of both the old and new generations, and, instead of being assimilated, each separate element is only becoming tougher and tougher and more segregated as the fires burn. What we need is not a melting-pot, but a colander to strain the ingredients of our national stew before we try to mix them.

Schools

IN a very complete classification of the different kinds of buildings constructed in 1923 we found that schools took the lead with a percentage of 19.67, ranking next to apartments. This is significant of the increase of our suburban population, as well as the ever-growing numbers in our cities.

The predictions for 1924 promise an immense further development in school building, and we have noticed with much pleasure that the general character of our school architecture goes on improving. It has already reached a high point in efficiency, and the many demands of our modern education programmes for the people have been met with good judgment and, by and large, with excellent taste. Our school architecture in itself is a part of our educational system, or should be so considered, for few things more contribute to better citizenship than even a little knowledge of the arts; and architecture is the one of all the arts that becomes, consciously or unconsciously, a part of our daily lives.

It would be a good thing, it seems to us, if the teachers in our beautiful new school buildings could be induced to instil a pride of ownership in their pupils and tell them in simple terms something about the architectural details of the buildings in which they spend their student days. Why not work in a bit of Grecian or Roman history in pointing out some detail derived from these great sources of inspiration in ornament?

We feel quite sure the architects would be glad to supply sufficient information to be put in the form of a little folder, that would relieve the teaching force of any necessity of spending too much time over Bannister Fletcher or Professor Hamlin's admirable short history of architecture.

Probably the students who have the privilege of living in the beautiful Harkness Memorial at Yale absorb enough Gothic to keep them interested in the style all the rest of their lives.

Fellowships of the American Academy in Rome

THE American Academy in Rome has announced its annual competitions for fellowships in architecture, painting, sculpture, musical composition, and classical studies. The stipend of each fellowship in the fine arts is one thousand dollars a year for three years. In classical studies there is a fellowship for one year with a stipend of one thousand dollars, and a fellowship paying one thousand dollars a year for two years. All fellows have opportunity for travel, and fellows in musical composition, from

whom an extra amount of travel is required in visiting the leading musical centres of Europe, receive an additional allowance not to exceed one thousand dollars a year for travelling expenses. In the case of all fellowships, residence and studio (or study) are provided free of charge at the Academy.

The awards of the fellowships will be made after competitions, which, in the case of the fine arts, are open to unmarried men who are citizens of the United States; in classical studies, to unmarried citizens, men or women. It should be particularly noted, however, that in painting and sculpture there is to be no formal competition involving the execution of work on prescribed subjects, as formerly, but these fellowships will be awarded by direct selection after a thorough investigation of the artistic ability and personal qualifications of the candidates. Candidates are requested to submit examples of their work and such other evidence as will assist the jury in making the selection.

Entries will be received until March 1. Circulars of information and application blanks may be obtained from Roscoe Guernsey, Executive Secretary, American Academy in Rome, 101 Park Avenue, New York City.

Textile Study at the Metropolitan Museum of Art

IT is not so many years back that the American designer of textile fabrics who could not afford a trip abroad was obliged to content himself, in his search for inspiration, with publications such as Owen Jones's "Grammar of Ornament" or "Polychrome Art"; but to-day every advantage accorded to students in foreign museums is available in New York.

The Textile Study Room of the Metropolitan Museum of Art was opened in 1910 with a small collection of fabrics that has since increased to some 12,600 specimens. The smaller pieces are mounted on frames arranged as a reference library, while larger specimens, available upon request, are stored on near-by shelves.

The value to students and designers of a collection of this magnitude is summed up in the remark of a designer of many years' standing who happened upon the study room recently: "There is enough material here to last one a lifetime." This man is associated with one of the largest New England plants, where, like many another in his line of work, he spends his days amid the din and roar of power-driven machinery, with many an hour devoted to the close scrutiny of the dazzling checked paper of the working pattern. In such an environment what chance has a man for the play of his imagination? Is it surprising that our patterns have lacked the spontaneity of the French, when under such conditions they stand every chance of becoming quite as mechanical as the power-looms that turn them out?

Fortunately, during recent years manufacturers have realized that it is no longer wise to foist upon the American market a patterned fabric that has been copied from recopies of a once original French silk. In fact, when the study room opened one of the first to avail himself of the collection was a French designer interested in lace. Since then the numbers applying have increased a hundredfold, until last year 2,535 sketches were made by 1,305 visitors, and manufacturers are acquiring the habit of turning to the museum for material to be used by their designers. Students from the art schools seem to confine themselves principally to painstaking copies of period designs, but the craftsman of creative bent selects some detail or bit of color as a suggestion for a line of decoration, often in a different medium.

Recently a teacher of design was attracted by the glorious color in a Roumanian embroidery. Being interested in pottery, he used this as a decorative key-note in a bowl, with charming results, the textile design with its rich color adapting itself delightfully to the different medium. The wide area of themes covered by the collection is illustrated in the case of another designer who adapted the pattern from a cashmere shawl to a container for Persian perfume. On the other hand, textile designers often work directly from the Chinese porcelains that always prove a rich field of inspiration for color and from armor that has inspired patterns found in recent neckwear silks. Thus, on every side the museum holds a mine of material to the trained eye that has the vision to see in one medium material adaptable to expression in another.

The Textile Study Room is on the second floor at the north end of the museum. To designers the Metropolitan Museum issues a sketching card granting free admission on pay days and other privileges. Those interested may obtain such a card and descriptive matter by addressing the secretary of the Metropolitan Museum of Art, Fifth Avenue and 82d Street, New York City.

Architects Wanted

OFFICE OF THE CITY SERVICE COMMISSION
SEVENTH FLOOR, CITY HALL
MILWAUKEE, WIS.

THE EDITOR OF ARCHITECTURE.

Dear Sir: The City Service Commission of Milwaukee has been asked by the Milwaukee School Board to search anywhere in the United States for qualified architects for two new positions known as Chief and Assistant Chief of a new Bureau known as Buildings and Grounds, the salary of the two positions, which must be full-time service, being from $6,000 to $9,000 for the first and from $4,000 to $6,000 for the second.

The Milwaukee School Board has an immense school-building programme before it, part of which is caused by lack of building during the war period and the time immediately following, and part by the normal increase of the city and the demand for new school buildings. They have been dependent for their architectural work on a local firm, Van Ryn & DeGelleke, the work being handled by this firm on a part-time basis. The School Board has determined that in order to meet the need of the large number of new buildings they must have two full-time architects, and have, therefore, created this new Bureau, which will also include the necessary draftsmen, etc. It is estimated that within the next five years approximately $6,000,000 will be spent on new construction.

On account of the need for the immediate securing of such men, competition in which candidates submit designs on some standard specification will be dispensed with, and candidates will be requested only to answer a questionnaire on training and experience and to submit samples of executed work. A competent examining board of architects will go over these questionnaires and the work submitted, and those persons who are considered properly qualified will be called together, either in Milwaukee or some other city centrally located for the candidates, for a personal interview.

No architect interested in these positions should hesitate to immediately send in to the City Service Commission for a formal application.

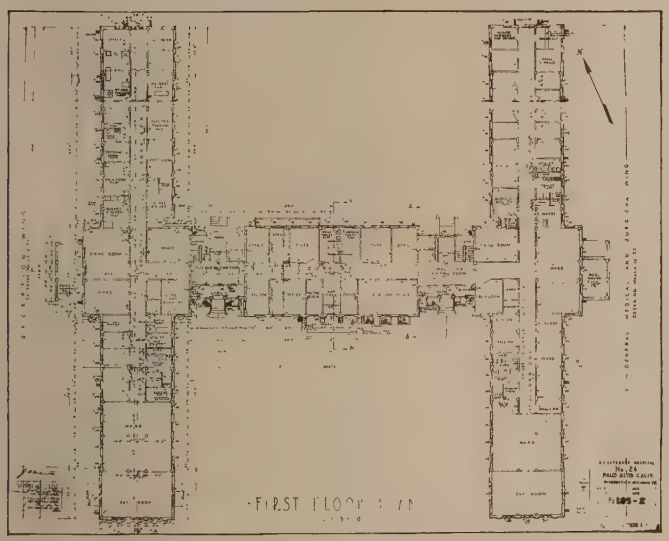
The City Service Commission will appreciate your calling the attention of any of your readers who are qualified and interested to these two vacancies.

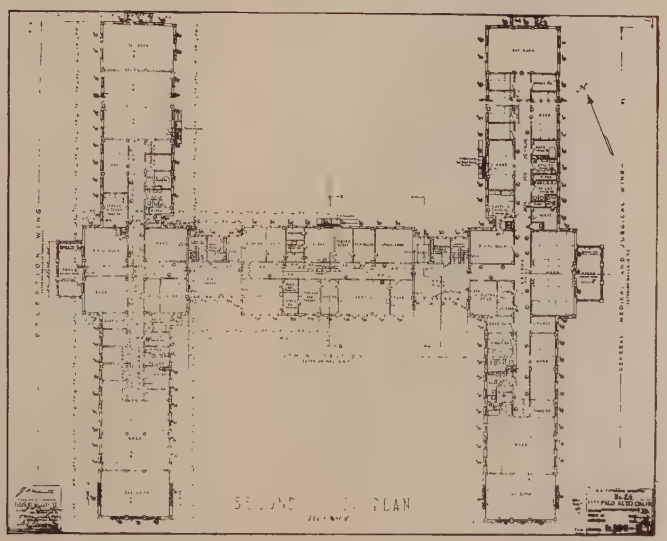
Very truly yours,
M. H. PLACE,
Secretary.

STUDY FOR STANDARD TYPE GENERAL HOSPITAL.

MAIN BUILDING, U. S. VETERANS' HOSPITAL, JEFFERSON BARRACKS, ST. LOUIS, MO.

Office of Supervising Architect, Treasury Department.



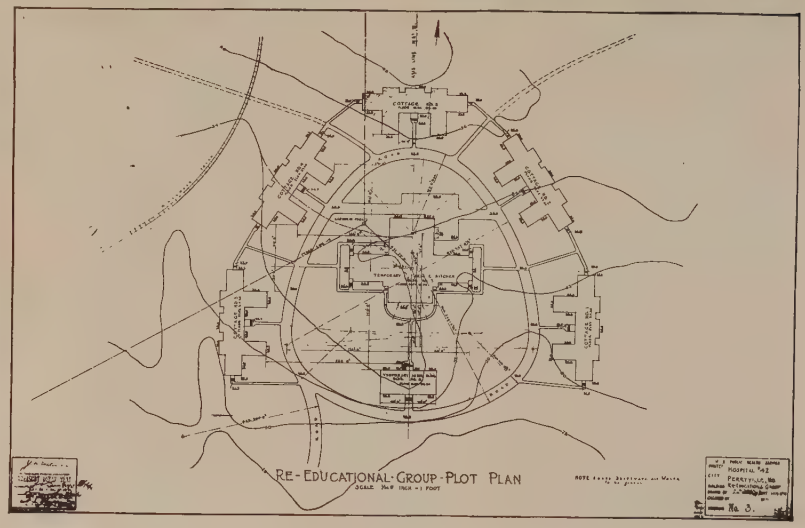


DIAGNOSTIC UNIT, N. P. HOSPITAL, PALO ALTO, CALIF.

Office of Supervising Architect, Treasury Department.

HOSPITAL GROUP.

TYPICAL COTTAGE.

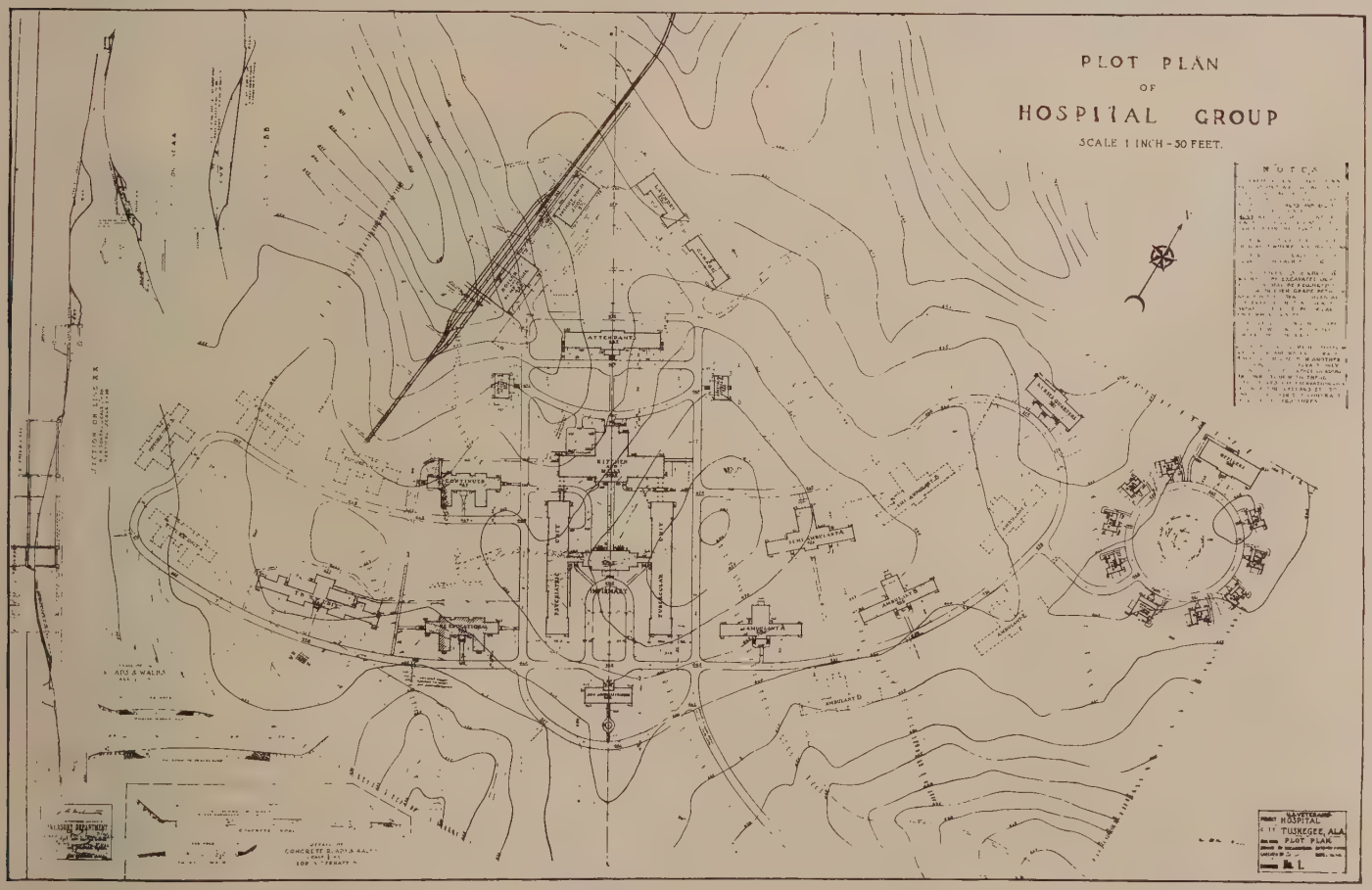


TEMPORARY ADMINISTRATION BUILDING.

TEMPORARY MESS HALL AND KITCHEN.

PUBLIC HEALTH SERVICE HOSPITAL No. 42, RE-EDUCATIONAL GROUP, PERRYVILLE, MD.
Office of Supervising Architect, Treasury Department.

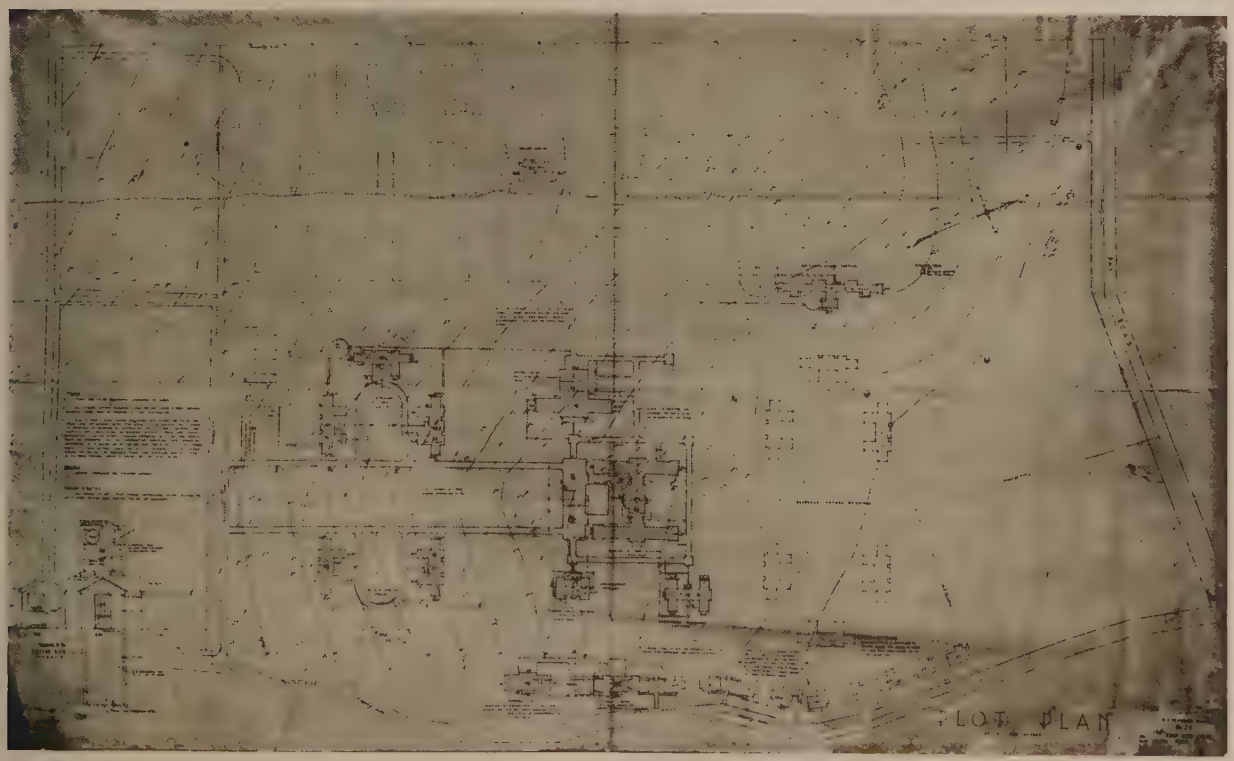
AEROPLANE VIEW.



HOSPITAL GROUP, TUSKEGEE, ALA.

Office of Supervising Architect, Treasury Department.

AEROPLANE VIEW.



U. S. VETERANS, HOSPITAL, PALO ALTO, CALIF. Office of Supervising Architect, Treasury Department.

LUCIUS BEEBE MEMORIAL LIBRARY, WAKEFIELD, MASS.

Cram & Ferguson, Architects.

READING–ROOM, LUCIUS BEEBE MEMORIAL LIBRARY, WAKEFIELD, MASS. Cram & Ferguson, Architects.

READING–ROOM, LUCIUS BEEBE MEMORIAL LIBRARY, WAKEFIELD, MASS.

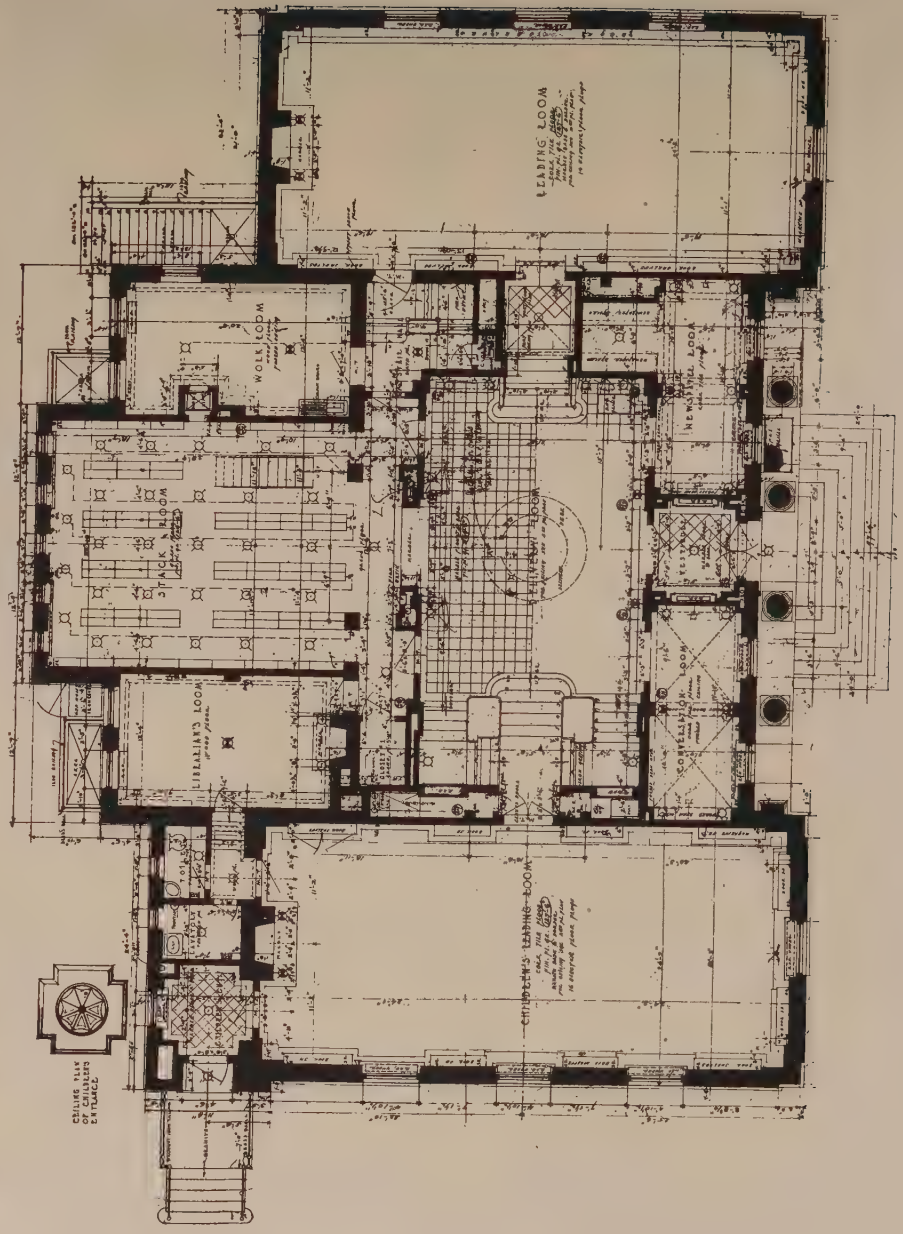
Cram & Ferguson, Architects.

DELIVERY-ROOM.

STAIR AND BALCONY DETAIL, DELIVERY-ROOM.

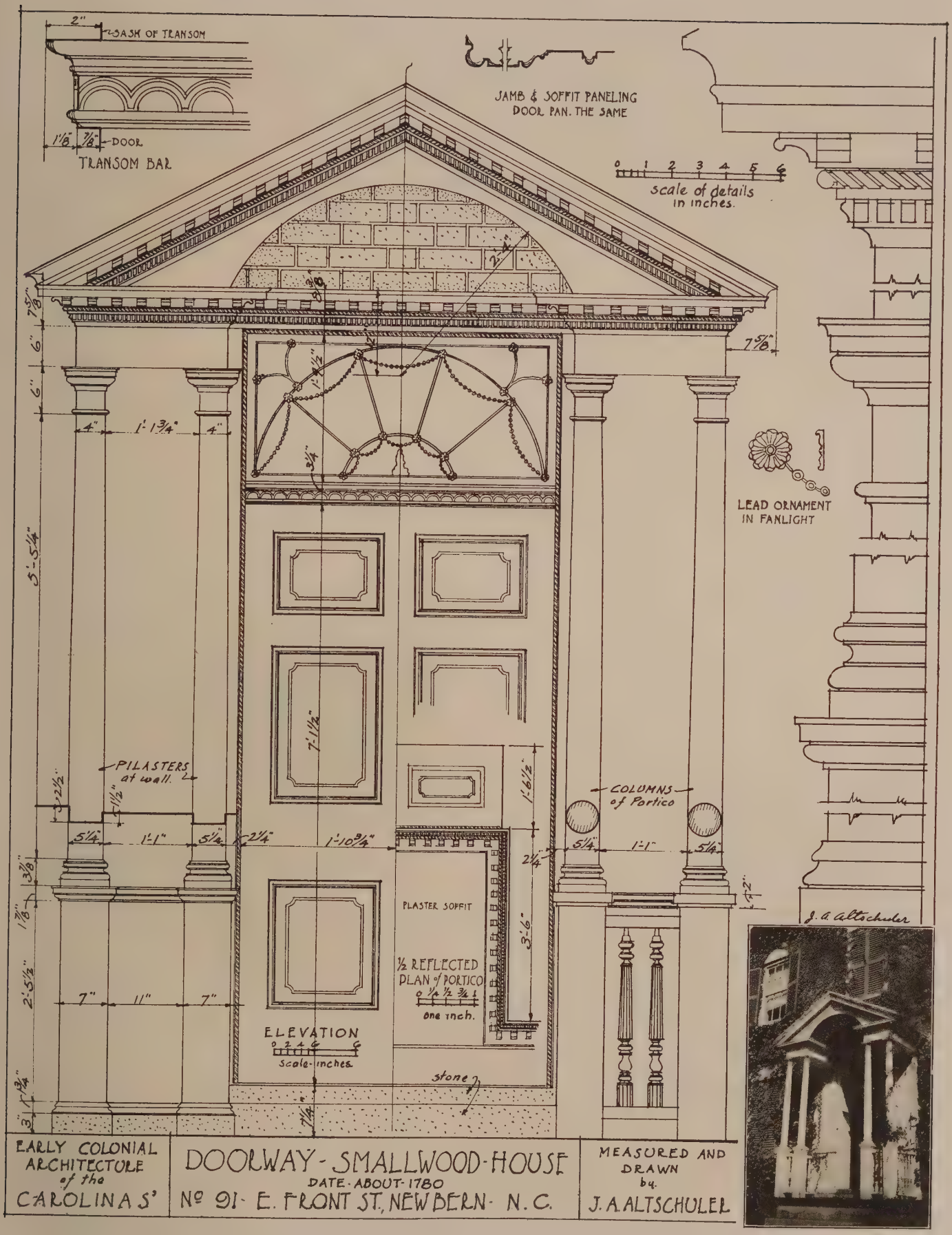
LUCIUS BEEBE MEMORIAL LIBRARY, WAKEFIELD, MASS.
Cram & Ferguson, Architects.

CHILDREN'S ROOM.

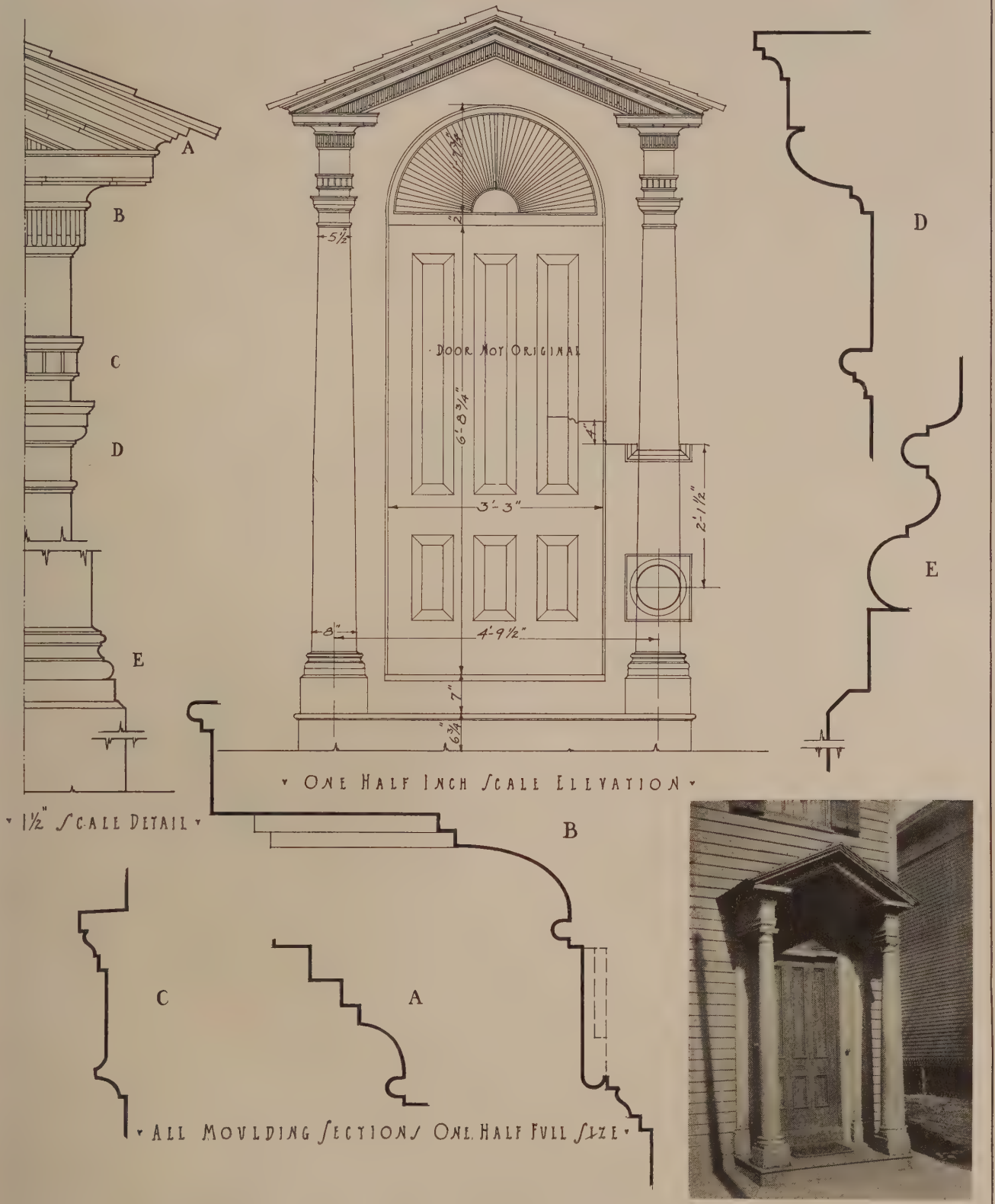


PLAN.

LUCIUS BEEBE MEMORIAL LIBRARY, WAKEFIELD, MASS.
Cram & Ferguson, Architects.



EARLY COLONIAL ARCHITECTURE of the CAROLINAS	DOORWAY - SMALLWOOD-HOUSE DATE - ABOUT - 1780 Nº 91 - E. FRONT ST., NEWBERN - N. C.	MEASURED AND DRAWN by J. A. ALTSCHULER



EARLY ARCHITECTURE OF CONNECTICUT	ENTRANCE PORCH - of an - OLD HOUSE at 39 WHALLEY AVE NEW HAVEN - CONNECTICUT	MEASURED BY J. FREDERICK KELLY. DRAWN BY HENRY J. KELLY.

CITY HALL, STOCKHOLM, SWEDEN.

Ragnar Oestberg, Architect.

The City Hall from the west, showing the gardens and the terraces. It is evident resemblance here to the Doge's Palace in Venice that makes some people feel that it is not true Swedish architecture. The statues are symbolic representations of Sweden's artists and authors. The one in the foreground on the left is Strindberg.

DINING–ROOM, CITY HALL, STOCKHOLM, SWEDEN.

Ragnar Oestberg, Architect.

THE COUNCIL CHAMBER.

In the middle under a great canopy is the chair of state, and grouped around it at a lower level are the seats of the deputies. The furniture and the draperies are of mahogany and rich red, which goes very well with the light oak walls. High overhead the painted beams, done in the old Swedish manner, crown the whole with a pleasant color harmony and add dignity to whatever may transpire below.

THE BLUE HALL. Ragnar Oestberg, Architect.

A view of the Blue Hall, looking toward the windows of the Golden Hall. Above is a great grille in gold—the organ loft. Careful examination of the brick wall will show the pattern tooled on its surface.

CITY HALL, STOCKHOLM, SWEDEN.

THE EAST ELEVATION.

THE NORTH ELEVATION.

CITY HALL, STOCKHOLM, SWEDEN.

Ragnar Oestberg, Architect.

The Golden Hall, which is used for receptions and banquets.

The City Hall, Stockholm

By S. R. McCandless
Sheldon Travelling Fellow in Architecture, Harvard University

IN the United States within the last thirty years—definitely since the Chicago Columbian Exposition—there has been a rebirth of architectural activity. It has been characterized by a breaking away from the uninteresting expression of the nineteenth century to a more academic, tasteful appreciation of architectural form.

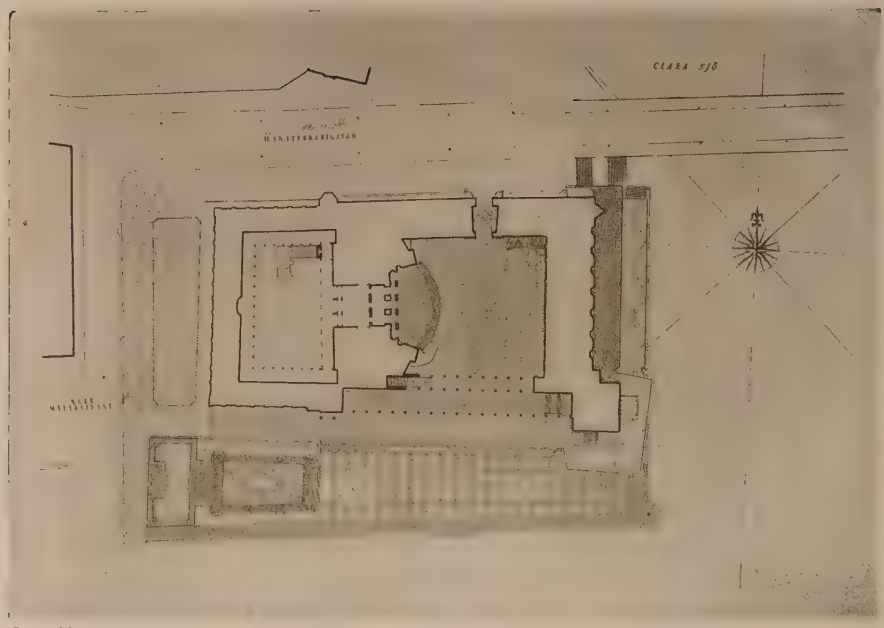
Similarly in Sweden, with the beginning of the twentieth century, there developed a vitally modern expression in architecture. While our own interests were turned toward fitting old forms to new conditions, here there has appeared a distinctly new style—an effort to interpret frankly the spirit of structural and decorative form with traditional Swedish elements. Perhaps the most obvious characteristic is the use of brick as a monumental building material. And it is not an unfortunate choice, because the economy in its use and plastic quality of its form enhance the distinctive difference that it gives a building conceived in modern form.

Where the Woolworth Building and the new home of the Chicago *Tribune* represent to us the modern expression of style in architecture, the Swede looks to the new City Hall of Stockholm. No other building in Sweden at the present time has been more the concern and the pride of the people. And during the last fifteen years, since it was decided that there should be a new centre for the community life of the capital, the architect has had one of the most stupendous responsibilities that has ever been placed in the hands of the profession. In Sweden, as in many other European countries, the "city hall" plays a much more vital part in the lives of the people than the same institution in our country.

Only the tempering influence of time will tell whether the architect has given the city and the people of Sweden an edifice that meets their needs and satisfies their national pride.

In 1903 there was a competition for the design of a new "Court House," and by it six architects were invited to enter a final trial. The result of this was the selection in 1906 of Architect Ragnar Oestberg. His plan was for a great granite building done in modern style, but there was a more pressing need for a "Stadshuset" or town hall. A committee was formed to draw up the programme and Architect Oestberg generously suggested a new competition. His proposal was rejected and he was appointed, on the basis of his having once won the prize, to be the architect. This was in 1908, and the designs were started, but due to the delay in finishing up some smaller buildings the ground for the new building was not broken until 1913. There are still some finishing touches to be done before the building is completed, but for the most part it was ready for occupancy two years ago.

The building in the first designs was to be of granite, but it was found that the estimates would require considerably more than the appropriation, and brick was selected as the building material—fortunately, perhaps, because most of the distinction of modern Swedish architecture lies in the excellence of its use, and its color in this cool climate adds warmth to a building.



General layout.

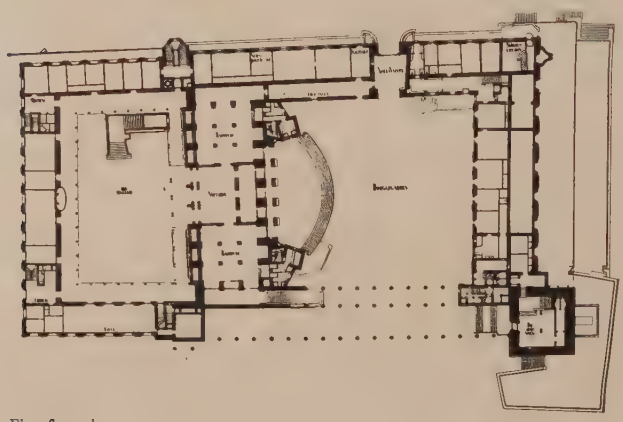
There are many incidents that add interest to the history of the construction. How the tower had the great copper lantern added to what had been planned to be a simple brick shaft with a square, flat top; how the copper roof was given, sheet by sheet, from popular subscription with a name on each—are merely incidents; and one wonders as he gazes at the finished product how it preserved the unity that it has. In it are the works of over fifty important artists, sculptors, and designers, not to mention the thousands of skilled artisans that were employed. And prominent among these is the King's brother, Prince Eugene. A whole brick-yard was kept busy several years turning out large-sized, specially burned brick. It is interesting to note that in spite of all the peculiar designs and figures in the brick-work, not one formed brick was used; rather, as in the "Blue Hall," they were tooled and carved after they were in place. In such a large building you might expect to find some detail of the common-stock variety, but no! Every feature, even the hardware and the fixtures for the small lights in the halls, has been specially designed.

Of all the interesting elements of the town hall there are two great rooms that are as dramatic in their aspect as many older ones that have grown rich with historical associations and years. Novelty is the *tour de force* of modern expression, and the architect has revelled here in this power. Nor is the pettiness of sham the offspring of the first impression; but rather interest in endless detailed execution.

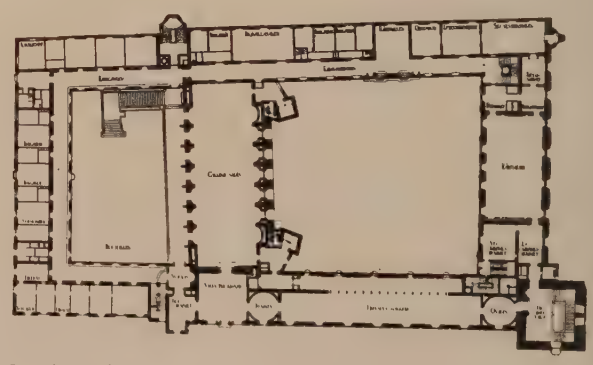
From the broad expanse of the great "Blue Hall" rises a great flight of steps, grand in scale and reminiscent of the Doge's Palace, to a broad balcony which runs the full length of the hall. From this the favored guests may view the festive crowds below or turn and resume the feast in the great "Golden Hall" behind. There is a thrill of surprise and delight when one steps from the rather modest room of the "Three Crowns" into the end of the "Golden Hall." One cannot but remember how of old the vikings used to gather in great timbered rooms, where "Skoal!" rang up and down the lusty board and generous bounty lay spread before the feasting multitude. Here is a banquet-room that retains the glory of those days and sets the spirit of the old in new form. It is 37 feet high, 45 wide, and 135 long. Each side wall contains seven large flat arches in which the windows are cut. It is through these on the west side that access can be obtained to the balcony of the "Blue Hall." The ends are plain. Overhead the dark, beamed ceiling is rich in subdued ornament. The walls, in gold inlaid mosaic, are beautifully decorated with symbolic figures and perfectly plain in surface. The long low lines of the furniture, richly ornamented and heavily built, give excellent scale to this majestic room.

Across the first great court from the "Golden Hall" and lying along the east side of the building is the "Radsalen," or Council Room. In size it is about the same as the former room, though much higher with its open trussed roof.

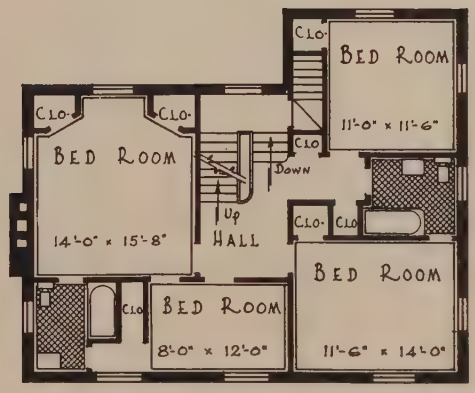
One feels at almost every turn that the architect felt the dramatic possibilities of the building he was creating. The color combination of the dark-red brick, crowned and set off by the green copper roof, and the whole accented here and there by gold domes and figures; the pleasing view from the inner court through the arcade to the terraces, the fountains, the water, and the old city beyond sparkling in the sunlight; the odd-shaped domes and the irregularly shaped courts—all these tell that the artist's eye was on the picturesque. There are those who may find that the organic structure of the building may have suffered from this very element, but it is a majestic monument. It is a building by one of Sweden's greatest architects, nobly conceived and expressive of the best in modern Swedish spirit.



First-floor plan.



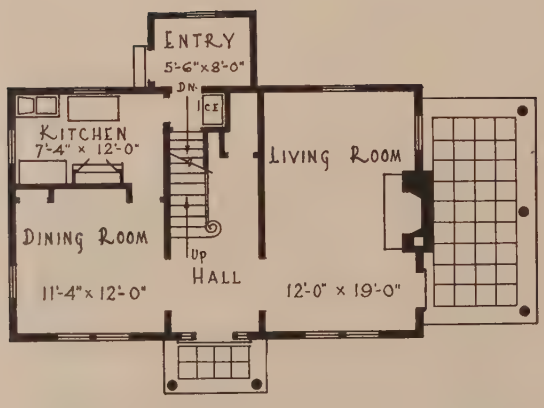
Second-floor plan.

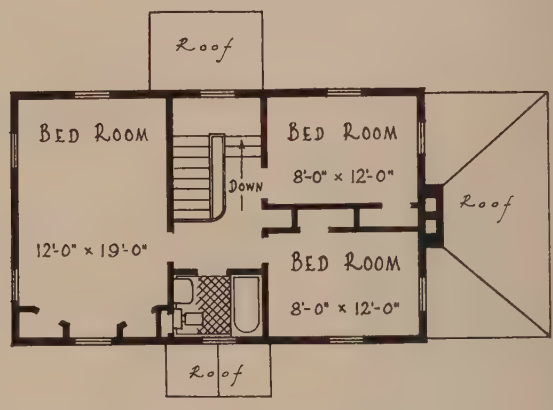


HOUSE AT WYNNEWOOD, PA.

Wallace & Warner, Architects.

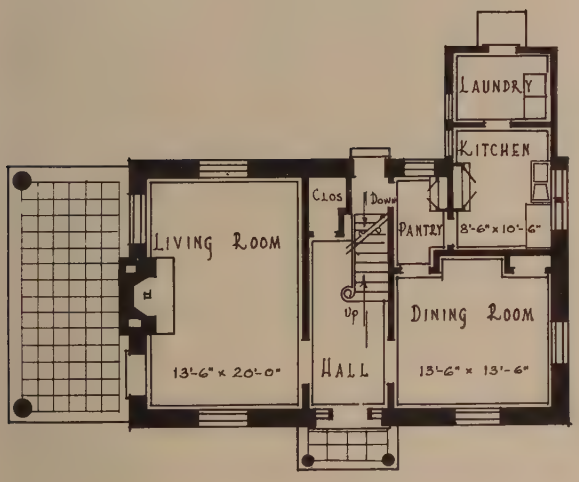
U OF I
LIBRARY

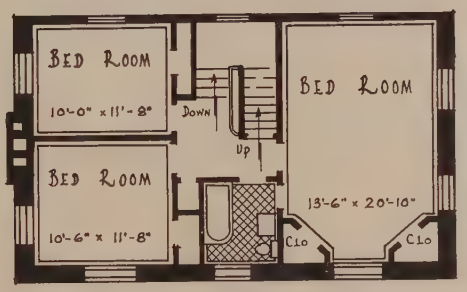




HOUSE, ROLAND R. FIELDS, ROSEMONT, PA.

Wallace & Warner, Architects.





HOUSE, A. S. JACKSON, ROSEMONT, PA. Wallace & Warner, Architects.

Construction of the Apartment-House

By H. Vandervoort Walsh
Instructor on Construction, School of Architecture, Columbia University, New York

ARTICLE XIII

Fireproof Floor Construction and Beam Protection

WE cannot avoid the economic conditions which determine to a large extent the selection of various types of fireproof floors in building apartments. Local conditions of the market make certain ones cheaper to erect than others of equal quality of fire resistance. The city building code or the fire-insurance companies have established certain standards of fireproof construction, and the selection of the type of floor must be within these limitations; but as there are quite a few types which conform to these standards, the choice in the end comes down to one of cost.

The floor that makes for economy of steel, of materials, and of workmanship and which uses local materials to the best advantage is the one used, provided it is an accepted fireproof type.

If we read the best building code it will be evident that, after the steel framework of beams and girders has been erected, the choice of floor construction which can be used in the floor panels is limited to brick arches, hollow tile arches, or reinforced concrete slabs. Of these three types the brick arch is so obsolete that it never enters into the question. We have left, then, hollow tile floor arches and reinforced concrete slabs. Of these there are a number of variations. Indeed, if we made a complete list of all of the patented types of reinforced concrete and hollow tile floors, we would have quite an extensive one. It is quite possible that all of them might be used in the construction of fireproof apartments under certain favorable conditions, but we are not dealing with possibilities but with common practice.

From our observation, we have noticed that the builders of apartment-houses have made a very definite choice in the matter. In the great majority of buildings being erected now, particularly in New York City, the choice has been made in favor of the reinforced concrete slab. Especially is that type of slab used which is reinforced by a wire mat that is spread over the tops of the steel I-beams. This reinforcing has the main wires arranged parallel to each other about four inches apart, these being held together by smaller wires woven diagonally in both directions, crossing the main wires every four inches, and giving the appearance of numerous small triangles. When delivered to the building this wire net is rolled up, and when it is spread over the tops of the steel beams it is quite a simple matter to lay the roll down on its side, push it along over the tops of the wooden forms, and extend the reinforcement over many beams. At the extreme end of each piece, the main wires have to be turned down like hooks over the top flanges of the steel I-beams. Always the wall girders are the critical beams over which the reinforcement must be hooked, and then, of course, a few within the body of the building around elevator shafts and the like. But there is a great temptation, apparently, to neglect the ends of this reinforcement as the walls are carried up, for we have seen masons become irritated with these wire ends and give them a clip, breaking them off rather than hooking them over the beam. Of course, after the concrete slab has hardened, it will stay in place under ordinary loads in this condition, but any unusual loads would be dangerous.

In determining the size of the wire in the mat, and also the thickness of the concrete slab, many factors have to be considered. The live load varies according to the restrictions of the building codes from forty to one hundred pounds per square foot. The beams are not equally spaced, and so the spans of the slabs vary, making it necessary to increase the strength of them over wide spans.

Usually for simplicity of construction a typical condition is selected, and the same size reinforcing net used throughout the building. The maximum span between beams cannot be over eight feet, according to the building codes. The standard minimum thickness of four inches for the concrete is applicable to this. As cinder concrete is used for lightness of construction its strength must be considered, as also the allowable stresses on the steel net permitted by the building code. The manufacturers of reinforcing mats of this kind have prepared tables from which the correct size of reinforcing wire can be selected, once such facts as the total dead and live loads are computed and the span and the allowable working stresses for steel and concrete settled upon.

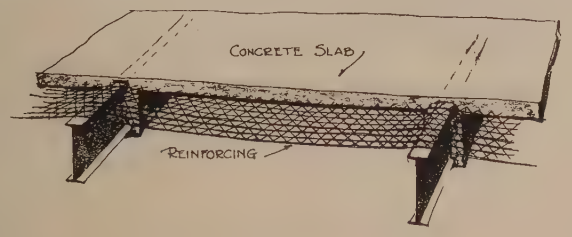
The reinforcement is supposed to drop down to the lower side of the slab at the middle of the span in order to take up the tension stresses. However, the steel wires ought to be covered with at least three-quarters inch of concrete on the under side of the slab, to protect them from the action of any fire. This is a very easy thing to neglect when the cement is being poured into the wooden forms.

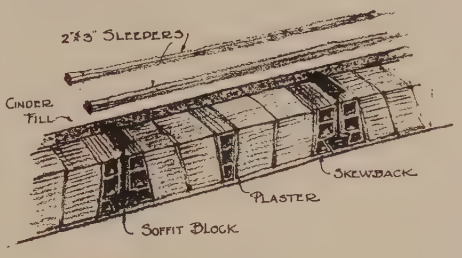
The great advantage of this type of reinforced concrete floor construction, besides the simplicity of arranging the reinforcement, is the fact that the fireproof covering for beams and girders is poured at the same time as are the slabs. The wooden forms are set up around wall girders, interior girders, and beams like troughs which encase them. The same forms are extended like platforms from one to the other for the support of the floor slabs. The simplicity of the construction of the forms is such that they can be used over again quite a number of times. Crumpled newspapers can be stuffed into the forms wherever it is necessary to keep the concrete temporarily away from column joints or pipe-holes. Rigid steel conduits for electric wires are laid right in the concrete when it is poured. Where the position of pipes is definitely known, galvanized sheet-iron sleeves are set down on the forms and the concrete poured around them.

Much of the success of these reinforced concrete slabs depends upon the quality of the cinders used. Hard coal cinders with little sulphur content are to be preferred, although hard-burned clinker from soft coal will do. Sulphurous cinders cause rusting of the steel, while soft clinkers make bad concrete.

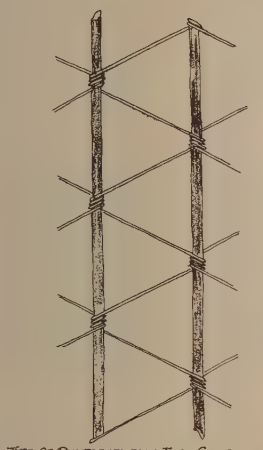
In building up the forms for the slabs and the fireproofing around beams, there are a certain number of general dimensions that must be followed. For example, since the slab is to be made four inches thick, the form is placed three inches down from the tops of the beams to make the slabs come one inch above them. As there must be at least a covering of one and one-half inches of concrete over all parts of beams for fireproofing, and three inches over wall girders, the forms must be so placed that this much will flow around the steel members at the time of pouring.

Now the under side of floor beams and girders needs ad-

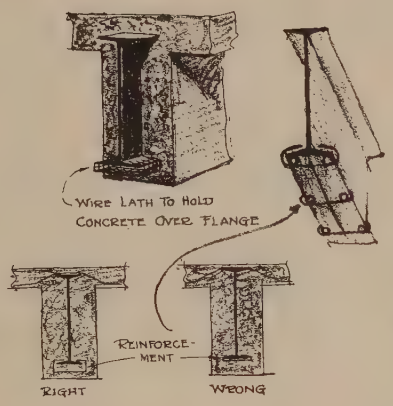


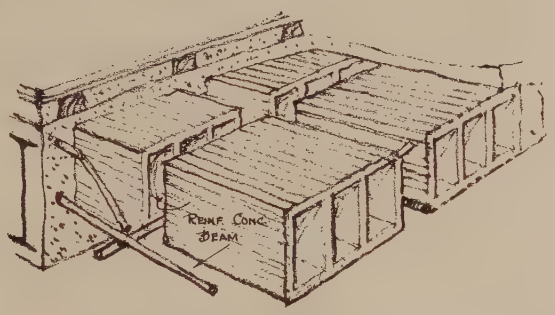


HOLLOW TERRA COTTA FLAT ARCH

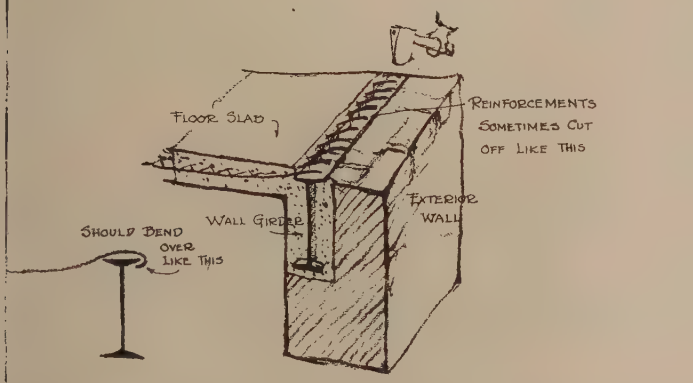


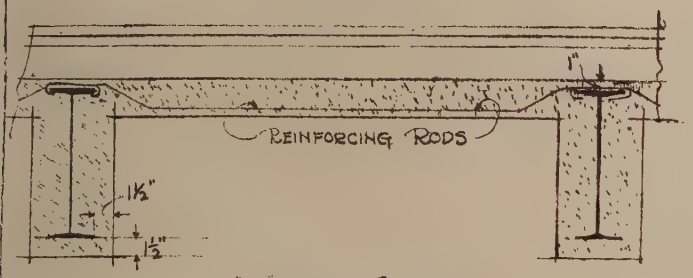
TYPE OF REINFORCEMENT FOR CONCRETE SLABS



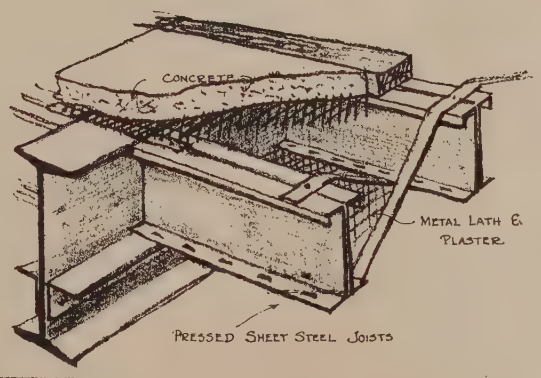


TILE WITH CONCRETE BEAM IN BOTH DIRECTIONS





REINFORCED CONCRETE FLOOR SLAB.



ditional protection. Plain concrete cast around the lower flange would, if exposed for some time to a fire, break off under the action of a cold stream of water from the fire-hose. To prevent this a wire reinforcement should be fastened to the lower flange to give a mechanical bond with the concrete. There are a number of patent wire clips made for this purpose. Metal lath closely wrapped about the lower flange gives no bond, and is the wrong thing to use.

Another feature that requires special attention in floors of this kind is the proper concealment of pipes in the bathrooms. This is easily taken care of if the slabs, instead of being cast on a level with the upper flanges of the beams, are cast at the level of the lower flanges. This lowers the ceiling of the bathroom, but permits pipes to be placed below the tile floor without making it necessary to raise it above the level of the floors in the rest of the apartment.

All the structural floors are levelled off with a cinder fill, a very lean mixture of cinders and concrete, and two

inch by three-inch nailing-strips, or sleepers, are fastened down sixteen inches on centre, being held by clips over the tops of the steel beams, for they run across at right angles to them. The spaces in between these sleepers are filled with the same cinder concrete, so that there will be no concealed pockets under the wood floors. This packing of material around the floor sleepers, although giving fire protection, shortens the life of the sleepers, because no air is permitted to circulate about them, and they absorb the dampness and rot out, causing the underflooring to spring loose from its base.

On top of the sleepers and at right angles to them the rough underflooring is nailed. Joints are left between the boards of about one-half inch to provide room for expansion when they absorb the moisture and to allow a little circulation of air around them.

On the rough underflooring is nailed the finished flooring, a layer of building paper being placed between to prevent the dust working up through the cracks from below. The main rooms of the apartments are commonly floored with oak, while the service portion has floors of combed-grain yellow pine. Often in kitchens and closets, a red colored composition flooring (a magnesium oxychloride floor) is put down, except directly under the gas range, sink, and laundry tubs, where a small patch of the floor is of tile. A coved base of the same material goes with the flooring. Bathroom floors are usually tiled, although sometimes terrazzo floors are laid for economy.

Now we have indicated what is the common type of floor construction, but mention should be made of others sometimes used. Particularly there is the flat arch construction of hollow terra-cotta tiles which span from floor beam to floor beam. The tile from which the arch springs (the skew-back) covers as fireproofing the beam by extending below the flange and holding under the soffit a small wedge-shaped tile, which ought also to be more securely fastened by wrappings of wire lath. The blocks forming the arch are not wedge-shaped, but like leaning parallelograms. The key-block, placed near the centre, is, however, wedged-shaped. The cells of the blocks extend across from beam to beam, but the cells of the key-block and skew-back blocks run parallel with the beams. The space above the blocks is filled with cinder concrete, on which sleepers are laid for the floor, as described previously.

Another type of hollow-tile floor is a cross between a reinforced-concrete floor and a tile floor. Beams of reinforced concrete are poured between the tiles, which merely act as fillers, having little structural value. These concrete beams may run in one direction or in two.

Much can be said for the hollow-tile floor. It can be set independently of weather conditions. It is not so sopping wet that it drips water down through the building. As the tiles finish flush with the bottoms of the beams, a level ceiling is obtained without furring. Of course, it is hard to fit the floor arches to special triangular-shaped bays, and any holes cut through the blocks are apt to weaken them, and there are mechanical drawbacks which generally make them cost more than reinforced concrete slabs.

There is a form of pressed sheet-steel joists that is often used in apartment construction. Wire lath is fastened to the tops and bottoms of these joists, and concrete is spread on the top and plaster on the bottom. This type of floor is not accepted by the building codes as fireproof, but only fire-resisting. It would be better if it were used more in ordinary non-fireproof apartments. It has properties of fire-resistance superior to light wood joist construction, because of the elimination of combustible materials.

(*To be continued.*)

Book Reviews

COLONIAL INTERIORS, PHOTOGRAPHS AND MEASURED DRAWINGS OF THE COLONIAL AND EARLY FEDERAL PERIODS. By Leigh French, Jr., A.I.A. With an Introduction by Charles Over Cornelius. William Helburn, Inc., New York.

There has been a need for just such a book as this, one that includes enough authentic material of a selected character to afford a comprehensive and representative showing of some of the most approved and admired work of the seventeenth, eighteenth, and early nineteenth centuries.

Mr. French is himself an architect of more than ordinary knowledge of his subject, and he has selected his examples with the good taste and understanding of the requirements of the man who is thinking in terms of the Colonial when he designs a modern house.

After all is said and done, the architect finds it hard to get away from the charm and domestic appeal of the old houses. Modify as he may—and that is his privilege and the way he can demonstrate his originality—if he is wise he will confine his originality to the use of modern constructive methods chiefly and stick pretty closely to the things that time has proved. In his introduction Mr. French says: "My idea in compiling this book is to offer to the architect and layman a more complete summary of the various existing examples of early American interiors, and I have endeavored to make it primarily a pictorial rather than a documentary one." Mr. Fiske Kimball has given us in his fine volume on "Domestic Architecture of the American Colonies and the Early Republic" a documentary record of the greatest value, but that is a book for the student of history quite as much as a guide to the development of various architectural details.

The writer of this review was asked only recently if he knew of a book that gave a number of photographs of old Colonial stairways. Mr. French has gathered many of great charm, just as he has gathered many interesting and delightful examples of general interiors, fireplaces, interior doors, windows, and cupboards, and included a number of scaled details; and of course no book of this kind would be complete without a comprehensive showing of mantels and fireplaces.

The examples chosen cover a wide territory and are typical of the best in Colonial, both North and South.

As Mr. Cornelius says: "No slavish copying of the old work will produce sincere and living architecture, but the greatest element of instruction to be gained from the study of such interiors as are shown in this volume lies in an appreciation of how our early builders translated the forms of European work into a vernacular which they so well understood."

The photographs are admirably reproduced and the book is handsomely printed. It should find a welcome in every architect's library.

BERMUDA HOUSES. By John S. Humphreys, A.I.A., Associate Professor of Architecture, School of Architecture, Harvard University. Marshall Jones Company, Boston, Mass.

It is a wonder that some one has not long since made a book of these charmingly picturesque and attractive little houses. The visitor to Bermuda carries away with him an impression of their quaintness, their brilliant color in the sunshine, their adaptiveness for cosey country homes in our more rugged climate.

As Professor Humphreys says:

"The architect of to-day, in designing small houses, is beset with many exactions and complications. The high standard of living, with its embarrassing variety of materials and appliances at the architect's disposal, the certainly high cost of labor and the desire for mechanical perfection and convenience, the client who knows too much and too little, and the passing fashions of revived styles and periods, all increase the difficulty of producing houses that fulfil requirements, satisfy clients, and at the same time have order, simplicity, and appropriateness to surroundings.

"The designers and builders of the old Bermuda houses had relatively few of these complications to contend with. Their pursuits were for the most part agricultural and seafaring, and their manner of life and their luxuries were simple. A generally mild climate, a fertile soil, and easily worked building stone always at hand, lime readily obtained, a plentiful supply of beautiful and durable wood, and cheap labor simplified their building problem. Traditions, if any, were those of English rural architecture, and these, interpreted by shipwrights rather than house-builders, applied to island materials and island life, have helped to give to the older buildings of Bermuda a particular interest and charm, and have developed an architecture worthy of perpetuation."

The illustrations include exteriors, interiors, various details, such as gates, doorways, garden walls, chimneys, fireplaces, etc. The plates are beautifully printed.

The text includes a brief history of Bermuda and comment on particular architectural features. Plans are included of several of the best-known houses.

The Lighting of Museums

By M. Luckiesh

Director, Laboratory of Applied Science, National Lamp Works, Nela Park, Cleveland

II

Sculpture Galleries

IN the case of paintings, after we choose the proper quality of light, we are primarily concerned with directing that light. With three-dimensional objects, shadows are of utmost importance, so that other considerations are involved.* They are as follows:

1. The direction of the shadow depends upon the direction of the dominant light; or, in other words, upon the position of the dominant light-source.

Fig. 8.

2. The number of shadows cast by any shadow-producing edge is equal to the number of light-sources.

3. The character of the shadow-edge depends upon the solid-angular extent of the light-source; or, in other words, upon the size and the distance of the light-source from the object.

4. The brightness of the shadow depends upon the amount of scattered light reaching it from the surroundings, such as the walls, floor, other objects, and from adjacent portions of the object itself.

The conditions can be such as to have any degree of harshness or of softness of shadow-effect desired. If the sculptor is wise, he will have only one dominant source (not too large in solid-angle) while modelling his work.

The writer has shown elsewhere the powerful effects of lighting on the appearance of three-dimensional objects. In Fig. 8 the effects of three ordinary systems of lighting are shown on a sculpture. The direct lighting system, *a*, included an ordinary lighting-unit and the scattered light from the ceiling, wall, etc. The second case, *b*, was that of a larger source corresponding to a luminous ceiling or ceiling skylight. The third case, *c*, is that of two windows at one side of the object. This is not satisfactory owing to the direction and the small amount of diffused light on the side of the object furthest from the windows. These are good examples of the three methods. Many results in museums to-day are representative of very much worse conditions than the worst of these.

* "Light and Shade and Their Applications," M. Luckiesh. Van Nostrand Co., 1916.

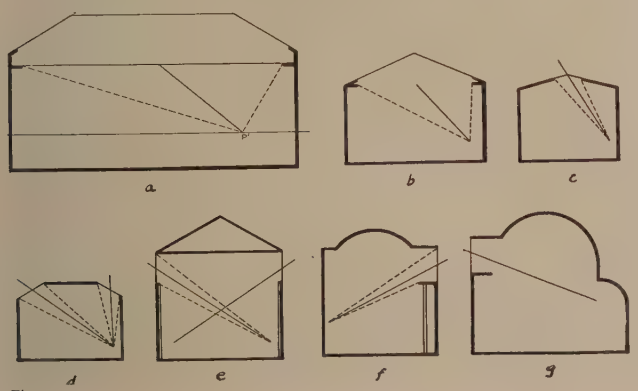


Fig. 9.

Outdoors on an overcast day many objects become more or less characterless, and they retain apparent modelling largely due to dirt which has collected in the depths of the details. On a clear day the sun sharply models the object and, owing to the great amount of light from the sky and surroundings, the sculpture is not so harshly modelled by the sun (practically a point source) as it would be if the skylight and scattered light were not so plentiful. In general, a softer effect is desired indoors, and this can be obtained by a light-source of greater solid angle; however, when this approaches the solid-angular extent of the unobstructed sky, the modelling suffers greatly and is largely obliterated or at least inconspicuous.

That the various factors which influence shadows are not generally clearly understood or are generally neglected is evidenced by the variety of skylight area and position which is found in sculpture galleries at the present time. In Fig. 9 are shown elevations of seven different galleries. Considered from the view-point of shadow-producing effect, the differences are very marked. The solid diagonal line shows the dominant direction of light and the dashed lines show cross-sections of the solid-angular extent of the light-source. In general, an oblique direction of light from above and in front of the object is most satisfactory. From this standpoint, the galleries represented in Fig. 9 are fairly satisfactory excepting the cases of two or more light-sources (directions) of comparable intensities at a given object.

In *a* we have a very large solid-angle as compared with *c*, the two shadow-effects, of course, being greatly different. An intermediate condition, represented by *b*, is generally more satisfactory than either extreme, although if the objects in *c* were confined to a space close to the wall and the light was adequate, good modelling would result. In *d* is the condition approaching that of multiple shadows; furthermore, there is a relatively strong vertical component which is accentuated by the lack of a continuous skylight. In *e* clearstory windows are used. The direction and

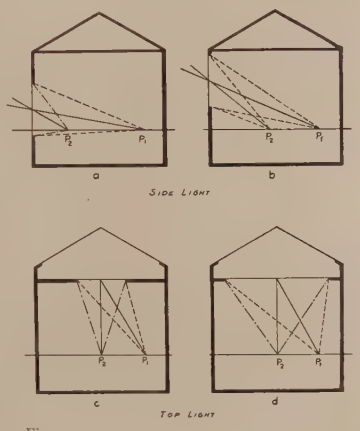


Fig. 11.

Fig. 10.

the solid-angular extent of the light-source are very satisfactory for modelling objects close to the wall. Objects in the middle of the floor would not be so definitely and satisfactorily modelled. In *f* is represented a very satisfactory condition for objects placed along the wall opposite the window, but *g* is even more satisfactory for important works because each can be isolated in its private niche. A satisfactory modification from a lighting standpoint is illustrated in Fig. 10.

In designing a sculpture gallery with natural lighting it is well to build a small model so that the effect of the extent and position of the glass areas can be studied by means of small objects placed in various positions within it. The model can be placed on the roof so that the sky can be used as a light-source, or it is easy to provide an artificial sky for the purpose by brilliantly illuminating a ceiling of a room or a smaller area located over and around the upper portion of the miniature gallery. The modelling effects can be studied through peep-holes in the sides of the model.

A common criticism of artificial lighting is the multiplicity of light-sources and the consequent multiplicity of shadows. The ideal is a single dominant source of sufficient solid-angle. This might be a huge fixture of diffusing glass or an area of subskylight which obscures a number of light-sources. A large fixture consisting of a group of diffusing glass units can be so devised as to give a single shadow. In any case, surroundings of fairly high reflection-factor are desirable in order that the shadows will not be too dark. If the sculptures are more or less isolated in niches, it is easy to locate the lighting units so that each object is dominantly illuminated by one source. Where rows of lighting units are necessary, their height, spacing, and location with respect to the objects should have careful consideration. Here again it is well to experiment, for it is an easy matter to study the effects on a full-size scale, or nearly so.

In large sculpture galleries illuminated as in *a*, *b*, *c*, and *d*, Fig. 9, the objects should be confined to areas near the walls if possible. This arrangement is not only usually better in appearance, but is best from a lighting view-point. In Fig. 11 the difference in the lighting effects at two different places, P_1 and P_2, is illustrated for side-lighted and for top-lighted galleries. It is seen that the dominant direction of light differs considerably. The solid-angle changes some but not materially.

Cases

It is often difficult to see objects displayed in glass cases owing to the images of primary light-sources and of other bright areas being reflected by the glass into the eyes of the observer. By studying the conditions in a manner similar to that shown in Fig. 1, most of the difficulties can be overcome. There are a number of small efficient show-case reflectors now available, and localized lighting, if well done, is always welcomed by the observer. This increases the brightness of the objects and their background in the case so that many of the images reflected from the glass are overwhelmed or "drowned out." Furthermore, unless a very much greater intensity of general lighting is adopted in museums, the details of objects in cases often cannot be seen satisfactorily without local lighting.

In general, cases whose glass tops are below the eye-level, so that the objects must be viewed through the top, should not be located in rooms having extensive overhead skylights or bright ceilings. Diagrams illustrating the simple law of reflection will convince one that escape from the reflected image of the skylight or bright ceiling is rarely possible. This is not so generally true when there are only a few pendent artificial-lighting units, for a position can usually be found where the images are avoided. Such low cases are quite satisfactory in rooms illuminated by windows only on one side. Here the observer can so locate himself

Fig. 11.

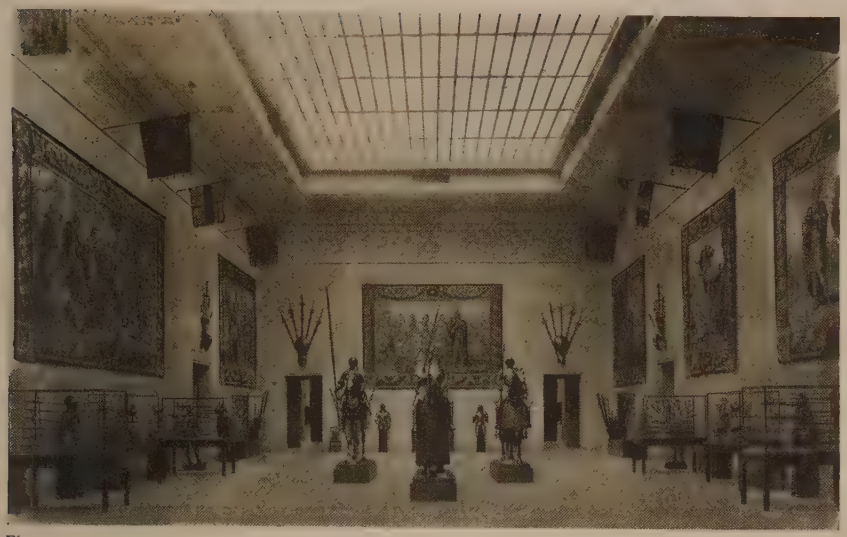


Fig. 12.

as to avoid the reflected images, but this is practically impossible if the cases are between the observer and the window.

Tall glass cases with vertical sides through which the objects are viewed are usually quite satisfactory, provided the observer can view the objects from any side. Where the walls or other objects are of high reflection-factor, their images reflected from the glass are usually annoying unless the cases illuminated by proper show-case units. The desirability of cases of various designs and of locations for them can be predetermined by means of simple diagrams as suggested.

Miscellaneous

Paintings, sculpture, and cases embody three distinctly different lighting problems and view-points. Most of the other problems arising in museums consist of combinations of what has already been discussed, but the number and variety are too great to be discussed in detail within the scope of this article. Everywhere one looks in a museum he is confronted with various phases of light, color, lighting, and vision,* and the potentiality of modern lighting is so great that there are opportunities on every hand to make great improvements. In an existing museum, the difficulties are often very serious, owing to structural conditions, but in designing a new building the lighting can be borne in mind during the design. In fact, galleries designed without lighting analysis, such as have been touched upon in preceding paragraphs, are fit for exhibiting objects only by accident and not by design. However, the most suitable lighting cannot be provided without basing its design upon the character of the exhibit. Architects should do their utmost to commit the museum authorities to the character of the exhibits in each gallery before attempting the design of either natural or artificial lighting.

Miscellaneous exhibits, such as are found in archæological and natural history museums, can only be provided with general lighting of such a nature that an object placed on the walls or anywhere on the floor is adequately illuminated. This will not be the best lighting for each object, but it is the best that can be done when the exhibit is miscellaneous and without predetermined and fixed arrangement. Overhead skylights and lighting-units are suitable. Windows on one side only are preferable to windows on two or more sides in many rooms, especially the smaller ones; however, windows low on the walls are sources of glare and are not universally satisfactory. Modern artificial-lighting units are efficient and can be obtained of such characteristics as to distribute light over the walls and floor without glare. In Fig. 12 is illustrated a court of tapestries and armor. Owing to the nature of the exhibit, the best solution was an overhead skylight above which a great many lamps are placed in reflectors. In this case, the architect had installed many beams close to the subskylight. In order to avoid the conspicuous shadows, a great many light-sources were used. The skylight is 30 feet by 72 feet and 220 "daylight" lamps are located above it. The cost of this installation could have been much less if it had been possible to use fewer and larger lamps, but the great number of small ones was necessary to eliminate shadows of the beams on the skylight.

A simple and effective method of lighting rooms having miscellaneous exhibits is by pendent units as in Fig. 13.

Garden courts afford interesting problems. Here we have in effect an outdoor setting. Obviously, the lighting can simulate natural lighting outdoors during the day or at night. Any other lighting would be incongruous. In the Cleveland Museum, Fig. 14, the artificial lighting is done with street-lighting standards surmounted by modern "lanterns." This simulation of outdoors at night adds interesting variety.

Fig. 13.

* "Visual Illusions," T. Luckiesh. D. Van Nostrand Co., 1922.

CHANCEL AND BAPTISTRY
WINDOWS
FIRST BAPTIST CHURCH
OF JAMAICA.

George P. Ennis, Painter.
Joseph Hudnut, Architect.
W. E. Manhart, Associate.

Announcements

E. L. Robertson and L. R. Patterson, architects, announce the opening of their office, 310–311 Calumet Building, Miami, Fla.

Simeon Charles Levi, architect, well known to the profession in his former home, Chicago, is now quite firmly established in Los Angeles at Room 329, Douglas Building.

C. E. Schermerhorn, A.I.A., architect, and Watson K. Phillips, architect, announce the removal of their offices to 213 South Fifth Street, Philadelphia.

Alexander B. Trowbridge, architectural adviser, wishes to announce that on January 1, 1924, he opened new offices in the Bowery Savings Bank Building, 110 East 42d Street, New York, where his practice will be strictly limited to consultation service: Analysis of properties and building sites; economic study of projects; assisting in the selection of architect, either by direct appointment or by competition; counsellor during preparation of plans and construction of buildings; adviser in bank planning with special reference to economical construction of vaults.

Clarence E. Wunder, architect and engineer, announces the removal of his offices from 1415 Locust Street to 1520 Locust Street, Philadelphia, where he has leased the tenth floor in the modern office-building just completed.

William Tallman, architect, announces the removal of his office from the Winslow Building to the Decorative Shop, second floor, 271 Union Street, New Bedford, Mass.

Francis T. Hammond, architect and engineer, announces his removal from 545 to 590 Pleasant Street, New Bedford, Mass., specializing in mercantile, industrial, and residential designing and superintendence.

Frank H. Davis Company, general building contractors, have moved their offices from the Penobscot Building to 8471 Mackie Avenue, Detroit, Mich.

Judson N. Churchill, registered architect, announces the removal of his office from 514 Oakland Building to 906 Prudden Building, Lansing, Mich. Catalogues requested.

A name familiar to the building industry throughout the State of Ohio for the last fifty years will come to it through a different channel in the formation of an organization to be known as McDonald, McDonald & McDonald, architects and engineers, with offices at 902 Denton Building, Cincinnati, Ohio, and 67 East Eighth Avenue, Columbus, Ohio. The members of the firm are G. E. McDonald, Sr., G. E. McDonald, Jr., and Charles T. McDonald, all formerly connected with prominent architects doing work in Ohio.

Wins the Woodman Scholarship

THE Henry Gillette Woodman Scholarship for 1923 has been awarded to Mr. Gerald Kenneth Geerlings, who received the bachelor's degree in 1921 and the master's degree in 1922 from the Department of Architecture of the University of Pennsylvania.

Henry Gillette Woodman Scholarship.—Founded by the bequest under the will of George B. Woodman, deceased, in memory of his son. To provide for the payment of expenses or toward the expenses of one year's travel in Europe of a student or graduate of the Architectural Department. This scholarship is open to any holder of a degree who completes at the University of Pennsylvania the requirements of either of its degrees in Architecture—B.Arch. or M.Arch.

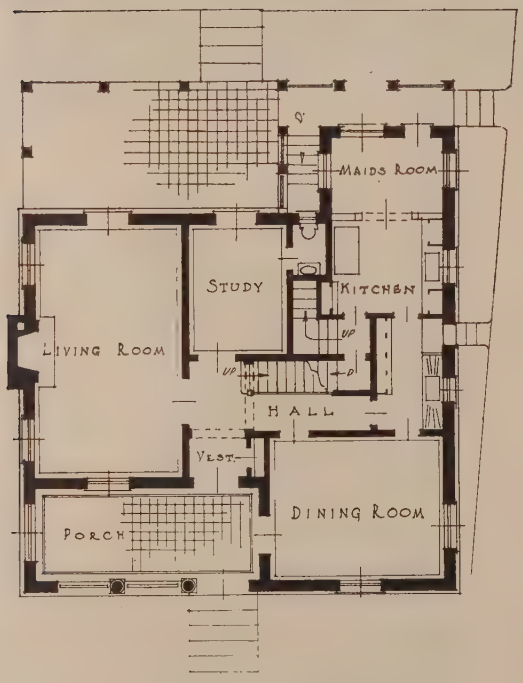
Mr. Geerlings was awarded the Brooke Silver Medal in 1921 and the Brooke Gold Medal in 1922 for meritorious work in design, and the Faculty Medal in Architecture in 1921 for the highest standing throughout his senior year. He is a member of the Theta Xi Fraternity and the Tau Sigma Delta Honorary Architectural Fraternity.

Alfred C. Bossom.

Mr. Bossom Honored

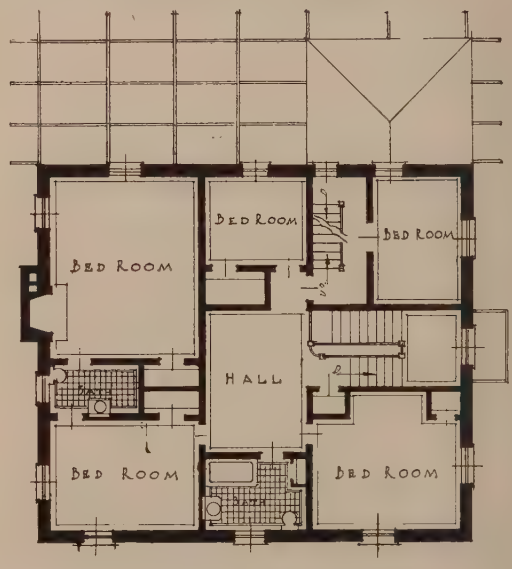
ALFRED C. BOSSOM has been elected a Fellow of the Royal Institute of British Architects, the time-hallowed institution in Great Britain, which received its royal charter under King William IV. Mr. Bossom is the first American to receive this distinction, which is awarded only on the grounds of "distinguished eminence in the profession of architecture." In the past fifteen years only ten architects have been elected to Fellowships in the Royal Institute. The two non-English architects to receive the Fellowship during this period are the late Frank Darling of Toronto and Sir Charles Rosenthal, K.C.G.M., of Australia.

During the years in which he received his architectural training Mr. Bossom, by means of scholarships which he won, paid all his school and college fees as well as the expenses of European architectural travel. He was the youngest student ever admitted to the Royal Academy of Arts in London. He was born in London in 1881 and won three scholarships organized by the London County Council between 1893 and 1897.



FIRST FLOOR PLAN

HOUSE AT GRAND RAPIDS, MICH.



SECOND FLOOR PLAN.

M. A. Wylie, Architect.

Perplexities of Estimating

By DeWitt Clinton Pond, M.A.

FIRST ARTICLE

ONE of the circumstances which make the architectural profession a somewhat difficult one to enjoy consistently is the not infrequent difficulty that the layman has in understanding that the architect has only a partial control over the cost of any building which he is designing. The client undoubtedly has in his mind the thought that he can go to his architect and have him show various samples of his work with the costs plainly marked, so that the client may choose what he wants in about the same manner that he can go to the stores and buy goods.

This is an age of quantity production, quick turnovers, and national distribution. The cost of a fountain pen is the same in one part of the country as in another. It is a standard product. The costs of Fords vary only in accordance with the variation in freight rates. The price f. o. b. Detroit is not subject to violent fluctuations from month to month. From pens to Fords we are accustomed to making purchases knowing in advance the price and qualities of the goods we are to buy. It is natural that in having a house designed and built we are apt to follow the same system. However, when it is a question of the cost of a house, which exists only in the imagination of the prospective owner and his architect, the system does not apply.

Although cloth, automobiles, furniture, and almost all of the articles that we use to-day are produced in quantities and sold nationally, houses or other buildings are still produced in much the same manner as they were in the Middle Ages—by hand, one at a time, and sold locally. Now when the client, who is being carried along by all the forces of the modern civilization, is suddenly confronted with a problem which might have perplexed burghers of the fourteenth century the result is not always pleasant either for him or for the architect who seems to be to blame for all the trouble.

To take a specific instance. A client wants to build a house. He feels that he can carry a $10,000 investment. He may have in mind a house which was built before the World War dealt everything on this planet an unsettling blow. The house may have been built in a part of the country where living costs were low and labor comparatively lower than in a metropolitan district. He will realize, of course, that there has been an advance in costs since the war, and that a building in one locality may cost more than the same building in another locality, but his ideas in this respect are somewhat vague. At any rate he feels that he should be able to have a seven-room house built with two baths, an attached garage, and special trim for $10,000.

Now, if he were purchasing an automobile he could go to the sales rooms of the various automobile manufacturers and learn the prices at once of the different kinds of cars, and if he has a thousand dollars to spend he will soon learn that it would be impossible to buy a powerful six-cylinder sport model at that figure. He will accordingly moderate his desires and will purchase a lighter car which will cost less than the one he may want.

But with regard to a house conditions are different. He will go to the architect and tell him that he wants a ten-thousand-dollar house in which there are the seven rooms and all the other requirements. The architect has not been trained to look at the client in the pitying manner of a salesman and say: "My dear sir, our seven-room houses cost not less than $15,000. Our six-room houses are costing around $11,000. Of course, if you care to look at those I will show you some samples." No! The architect will probably warn his client that he will be unable to have a house built at his figure. Then he will probably start to make some sketches.

Realizing that the client's desires are more than can be realized for the price he has in mind, the architect will make the rooms of the house as small as possible. As soon as the client sees the sketches he at once demands larger rooms. The architect again warns the client, but to no avail. The sketches are redrawn and finally accepted as a basis for working drawings.

And then the most difficult part of the situation arises, for when the working drawings are completed they are sent out for estimates and the lowest bid exceeds the figure which the client has in mind by about 50 per cent.

The client is naturally angry. He has wasted time in considering the plans, which he cannot use without making an almost impossible financial sacrifice. He has had to pay the architect for services of which he is unable to make any use. He feels that he has been led into a situation for which he is in no way to blame, but which makes him appear ridiculous. Of course, he blames the architect.

The architect will point out, however, that he warned the client at the beginning that the house would cost more than the figure he had in mind, that when the sketches were drawn the client insisted on having them made for a larger house, and that when the specifications were written expensive materials were insisted upon. Where, indeed, does the blame lie?

It is easy to blame the individuals in this case. The client will say that the architect knew from the start that the house should not have cost more than $10,000, and the architect can point to the fact that the client should have known that he could not have secured all that he wanted for that figure. However, the real trouble lies in the fact that each building is a new undertaking and not like machine-made products, in which the one-thousandth is similar to the twenty-fifth. It is possible to estimate the cost of machine-made articles and to establish a selling price which will include all commissions, profits, or other charges. It is not possible to establish the cost of a house until all the drawings are completed and all quantities taken off and the cost of labor estimated. Until this is done such a price is indeterminate and the figure that the architect must give can be only an approximation—a guess.

Every architect who builds a house for himself realizes this.

He himself cannot tell until his drawings are completed what his house is going to cost, and in no small number of cases architects are as unpleasantly surprised at the results of the estimates as a client would be under similar circumstances.

Should the architect have a knowledge of how to take

off quantities and to estimate the cost of labor, he would be in a better position to obtain a better understanding of the reason for the bid, but even under such circumstances he cannot tell what the cost will be in case a contractor builds for him, because he cannot determine what the contractor will figure as his profit, including such overhead charges as he may have. No one can tell this but the contractor himself, unless there is an agreement as to a fixed fee, or a fee based upon a percentage of the cost, and in this case the architect may be able to take off quantities himself, estimate the cost of labor, arrange with a general contractor to supervise the work at a determined fee, and so obtain a fairly accurate idea of the cost. But in order to do this working drawings will have to be drawn, or at least very complete sketches.

Until enough information is available so that it is possible to determine quantities no estimate, worthy of very serious consideration, can be given.

Therefore, when a man approaches the proposition of building a house he is in a position unlike that pertaining to almost any other undertaking with which he comes in contact in his daily affairs. Until he has paid a fairly large amount of money he is unable to know how much it is going to cost him to build the kind of house he wants, and then the bids may be so high that he will be unable to use the plans for which he has paid. How many suits of clothes, how many yards of cloth could be sold on this basis?

Suppose, when a man entered a store to purchase a set of golf clubs, he were told that they would have to be designed especially for him, and that he would have to pay for the design before the cost could be estimated. There would be very little golf played under the circumstances. But this is about the kind of a proposition which he must face when he wants to build. Is there any wonder that he would rather buy a house already built than to build one himself?

The average man, whose connection with architecture is confined to the design of his own house, meets the situation by having very little to do with the art. He simply buys such a dwelling as he is able to purchase—something already constructed, which was built probably by a speculative builder who has his own method of obtaining plans and specifications, if he uses such instruments of service.

There is probably no solution to the problem that will prove to be satisfactory, but much difficulty may be avoided if it is impressed upon clients that costs are sure to increase in direct proportion to an increase in cubic contents. Also, if an architect can obtain reliable information from which he can calculate the cost per cubic foot of the type of structure that he is designing, he may be able at least to show his client approximate estimates, which must be, however, only at best a guess.

This method of calculating the cost of a building on a basis of the cost per cubic foot is about the only method the architect has of estimating, unless he acts as contractor himself, which is contrary to approved practice. At times when there is but little variation in labor conditions and material prices certain types of work can be estimated with fair degrees of accuracy.

Architects who are familiar with school work can estimate the cost of a school building without drawing a line, if they are informed with regard to the amount of instruction area required. This instruction area should occupy at least 50 per cent of the total area of the school. As floor heights are more or less standardized in buildings of this type, the total cubic contents of a building can be estimated, and, as architects who are doing this type of work know about what schools cost per cubic foot, the cost can be estimated with a certain degree of accuracy.

Architects who are familiar with welfare buildings can estimate costs in the same manner if they know the size of gymnasium, pool, social space, and number of dormitory rooms required. Schedules can be drawn up showing the number of cubic feet required for each department, percentages added for corridors, stairs, toilet-rooms, and other service areas, and the total cubic contents determined. The costs of such buildings vary, of course, but in certain localities they can be estimated with a fair approach to the actual cost.

Such service is of great value to school boards and building committees, who usually are in search of just such information and who do not want to proceed with any architectural work until they can be informed with regard to costs.

Valuable as such types of service are, it is not always possible to determine even approximately the cubic contents of a building until the sketches are at least roughed out. As soon as this is done, however, and the contents determined, it is wisdom on the part of the architect to attempt to make a preliminary estimate based on such unit costs as he is able to obtain from those of similar buildings in the same locality, and to inform the owner as to what the amount to be spent for the building will probably be. Simply to continue to make sketches, and finally working drawings, without allowing the client to know what the architect considers as the probable cost of the building, is sure to result in misunderstandings. The author knows of instances, however, where this has been done.

Methods of calculating the number of cubic feet in a building vary, but it is customary to include a space one foot below the basement floor and a similar space one foot above the roof. As calculations of this sort always involve three dimensions, the use of the slide-rule makes for speed and is as accurate as the estimate warrants.

In comparatively small city buildings the cubic contents are not difficult to determine. Usually the floor plans are similar in outline from the basement to the roof, and can be divided into simple rectangular units the area of which it is a simple matter to determine. As the area of one floor is the same as the others, it is a simple matter to multiply by the total height from the basement floor to the finished roof, plus two feet, and in this manner obtain the total cubic contents.

In larger buildings, where there are several set-backs, courts, and irregular roof levels, calculations are somewhat more difficult. However, by tabulating results, dividing the irregular floor plans into various rectangles, and by multiplying by the proper floor heights the calculations can be carried through without much difficulty.

In previous articles, "Drafting-room Mathematics," the methods employed in using the slide-rule have been given, and by referring to these articles it can be seen that the process of multiplying by three figures is comparatively simple. Logarithms can be used also to advantage. In a following article these methods will be applied to various buildings.

22,000,000 People Live in Zoned Cities

MORE than 22,000,000 people, comprising 40 per cent of the urban population of the United States, live in 183 zoned cities, towns, and villages, according to a statement made public by the Division of Building and Housing of the Department of Commerce.

During the first eight months of this year 54 municipalities, with more than 6,500,000 population, have adopted zoning ordinances. This indicates the greatest progress in zoning that has ever been made during a similar period. More than two-thirds of the 183 zoned municipalities have been zoned since September, 1921.

Neighborliness in the use of land is said to be the keynote of zoning. The home owner is protected from the intrusion of the junk-yard which, for no good reason, might be moved into his neighborhood, and business and shopping districts are protected against noisy factories. Industrial plants have greater freedom in selecting sites convenient to good transportation. Such measures should provide for the use of the different kinds of land and districts within a city for the purposes to which they are best adapted and allow for orderly growth of commercial and industrial districts. They accomplish their purposes by regulating the height of buildings, the area of the land that they may cover, and the use to which they may be put in the different districts of the city or town. The zoning ordinance is generally an auxiliary to the city plan, and helps to provide for the orderly growth of the city along lines that will bring the most satisfactory results to all concerned.

Revised figures show that on January 1, 1923, 129 municipalities had adopted zoning regulations. During the year 54 more, some large and some small, located north, south, east, and west, have been added to the list. Of the 68 cities in the United States with over 100,000 population, 36 have zoning ordinances in effect. Chicago, Baltimore, Pittsburgh, Kansas City, Mo., Seattle, Providence, Columbus, Worcester, Grand Rapids, and Youngstown are among the larger cities which have adopted zoning ordinances this year. The smallest community to adopt a zoning ordinance in 1923 had only 420 inhabitants according to the last census. Twenty-one towns and villages of less than 10,000 inhabitants adopted zoning regulations in 1923. Seventeen communities with 10,000 to 50,000 population, and 16 cities with more than 50,000 population, also zoned during the year.

In the number of places zoned, New Jersey leads with 51; New York is second with 30; Illinois third with 23; California fourth with 17; Ohio fifth with 13; Massachusetts sixth with 11; Wisconsin seven with 10; and Missouri eighth with 4; Indiana, Kansas, and Michigan have 3 each; Rhode Island and Washington have 2 each; and Georgia, Maryland, Minnesota, Nebraska, North Carolina, Pennsylvania, Tennessee, Texas, Utah, and Virginia have 1 each. The District of Columbia also is zoned.

More new State zoning enabling legislation has been passed in 1923 than usual, and the standard State zoning enabling act, which was prepared by the Department of Commerce, was used to a greater or less extent in most of the laws. Connecticut, Delaware, Iowa, North Carolina, North Dakota, Oklahoma, Pennyslvania, and Wyoming passed important zone enabling acts, and a number of other States passed legislation supplementing or amending existing laws. The State of Wisconsin has passed an act granting to counties the power to zone.

The complete list of zoned municipalities as of September 1, 1923, with references to the State acts under which zoning is permitted, may be obtained from the Division of Building and Housing of the Department of Commerce, Washington, D. C.

1924 Marks Centennial of Cement Industry

OLD records on file in the British Patent Office show that in 1824—just one hundred years ago—an English bricklayer named Joseph Aspdin was awarded a patent for a material he called "portland cement." At that time a number of men were engaged in experiments in an effort to produce a cement superior to the natural cements then in use. As far back as 1756 an English contractor named John Smeaton had discovered that an impure limestone containing a certain amount of clayey matter possessed decided hydraulic properties when burned. Aspdin's contribution was his discovery of the value of taking proper proportions of different ingredients and then pulverizing and thoroughly mixing them before they were burned into clinker, which later was finely ground. He called his material "portland" cement because when it hardened it resembled a building stone quarried on the Isle of Portland.

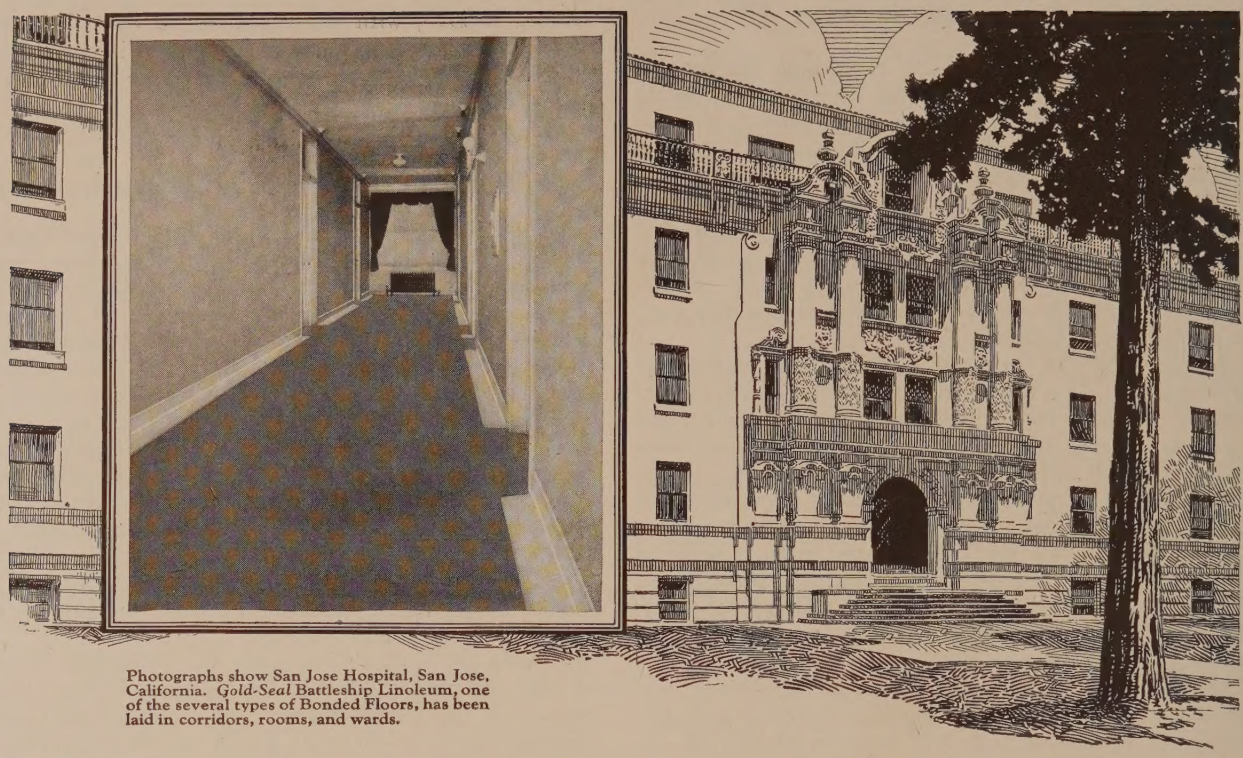
Although Aspdin's invention was brought out in 1824, it was not until 1872 that the portland-cement industry started in the United States. Of course natural cements had been used here for years, and in the late sixties imported portland cement was gaining a strong foothold in the American market. In 1872 David O. Saylor established a plant for the manufacture of portland cement at Coplay, Pa., and so far as can be ascertained this is the first plant of its kind to be started in this country. Within a few years other plants were built at South Bend, Ind., Kalamazoo, Mich., and various parts of the East.

Many interesting stories are told in connection with the early efforts to produce portland cement in the United States. One man used a cook-stove in which to burn rock while conducting his experiments. Another used a piece of sewer-pipe as a kiln, and ground his materials in a coffee-mill. Still another pressed a bent car-axle into service as a part of a grinding-machine. For a number of years the reputation of imported cements was so strong that American manufacturers had a difficult time in securing a market for their product. It was not until the late nineties that the home product took its place on an equal footing with imported cement, and eventually won the market.

One hundred years after the invention of the material, the plants of the United States are producing more portland cement than the rest of the world combined. United States Geological Survey figures indicate that about 135,000,000 barrels were made in this country in 1923.

This development has necessitated the revolutionizing of methods of manufacture. Where the early pioneers used crude dome-like kilns for burning their raw materials, a modern plant contains huge rotary kilns—steel brick-lined cylinders that may weigh as much as eight Pullman cars each. One of these great modern kilns will produce as much clinker in a day as one of the old kilns could turn out in a year. The old-fashioned grinding machinery has been supplanted by a variety of crushers and roll, hammer, and ball mills, in which the raw materials and clinker are reduced to a powder finer than flour.

The centennial of the invention of portland cement is an important date in industrial history, and as such will be fittingly observed by various organizations in the building field.



Photographs show San Jose Hospital, San Jose, California. *Gold-Seal* Battleship Linoleum, one of the several types of Bonded Floors, has been laid in corridors, rooms, and wards.

The Modern Hospital and Its Floors

A modern hospital throughout is San Jose Hospital, San Jose, California. It is logical, therefore, that the resilient floors of the Bonded Floors Company were the choice for corridors, wards and private rooms.

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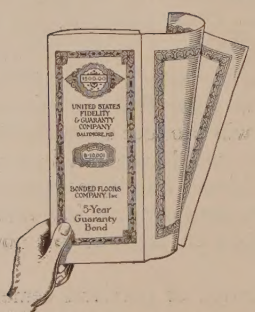

A folder, "Hospital Floors," showing typical installations, pattern suggestions and other interesting material will be sent on request.

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OVERMANTEL "VENETIAN SCENE" FOR MISS RUTH TWOMBLY. By Ernest Peixotto

Amber sky, reddish sails and palaces, and gray green trees.